The Holloman Test Track Impact Area Archeological Survey

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by
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This report documents the results of an intensive (Class III) cultural resources inventory of 1280 acres (518 ha) on White Sands Missile Range and Holloman Air Force Base conducted for the U.S. Army Corps of Engineers, Albuquerque District Engineering and Planning Division, Design Branch (CE) on behalf of the Holloman Test Track Division. The area surveyed represents the defined impact area for the Holloman High Speed Test Track Facility located north of Holloman Air Force Base proper in the Tularosa Basin, Otero County,

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This report describes the cultural resources located on the survey along with their environmental context, and provides significance evaluations and management recommendations within a research framework based on previous research and recent Office of Contract Archeology (OCA) research in the Tularosa Basin. Survey results are used to update the research perspective developed prior to the survey. The prehistoric survey data are contrasted with other data from the basin floor in terms of lithic assemblage composition, environmental associations, and spatial distributions.

THE HOLLOMAN TEST TRACK IMPACT AREA ARCHEOLOGICAL SURVEY

by

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Submitted by

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Site-specific locational data are not included in this report, but are available in a ***Data Compendium*** delivered separately to the Albuquerque District CE. The Data Compendium includes site and isolated manifestation locations, and all field forms. Copies of Laboratory of Anthropology (ARMS) site forms were delivered to the CE separately. The present report also contains photographs of the project area and specific sites. Further photographic documentation is available in a ***Photographic Notebook*** also delivered to the CE.

ACKNOWLEDGEMENTS

Even a relatively small cultural resource project benefits from the participation and assistance of numerous individuals and institutions. The Holloman Test Track Impact Area Archeological Survey is no exception.

First, thanks are due Ms. Sandra Rayl of the U.S. Army Corps of Engineers, Albuquerque District for coordinating the project, and for her advice and understanding. My thanks also go to Dr. Joseph Winter, Principal Investigator, for the opportunity and for his patience.

Special thanks are due Major Thomas Wildman of the Holloman AFB Test Track Division (Test Group Environmental Coordinator). Major Wildman coordinated the project with both Holloman AFB and White Sands Missile Range. In addition, he arranged for the crew to stay at Guilez Springs--where shade trees, a freshwater pond, and other facilities were available. Finally, Major Wildman voluntarily stayed late at his office so that the crew could use the showers at the Test Track after each day's work. For this he merits sainthood.

My gratitude is also due to the OCA crew who endured long hot days in the June desert--often with short or no breaks--in order to finish the field work in time. Marilyn Swift, Ron Kneebone (who also drafted the site maps), John Hays (historic artifact expert), Kurt Menke (auger meister), and Randy Harper, not only worked hard and well, but provided good humor and delicious meals in camp. Several among the OCA lab staff also deserve thanks for their contributions to the project: Lenora Olsen, Sheryl Jones, and Donna Lasusky.

Finally, I would like to thank my wife, Phyllis Doleman, who freely volunteered her time during a busy summer semester to enter artifact data and site descriptions and to help with the numerous tasks and details involved in producing this report.

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Chapter 1

INTRODUCTION

In April 1988, on behalf of Holloman Air Force Base (HAFB) Test Track Division (TTD), Alamogordo, Otero County, New Mexico, the U.S. Army Corps of Engineers, Albuquerque District Engineering and Planning Division, Planning Branch (CE) requested that University of New Mexico (UNM) Office of Contract Archeology (OCA) conduct an intensive (Class III) archeological inventory of the 1280 acre (518 ha) HAFB High Speed Test Track impact area (Figure 1.1). Field work was conducted between June 1 and June 10, 1983 in accordance with a Plan of Work developed by OCA and delivered to the CE in May of 1988. The field crew consisted of William Doleman (Project Director), Marilyn Swift, Ron Kneebone, John Hays, Kurt Menke, and Randy Harper. Dr. Joseph Winter of OCA served as Principal Investigator. The project was administered by Ms. Sandra Rayl of the Albuquerque District CE.

This report documents the results of the survey and laboratory research conducted in response to the CE's request. In addition, OCA has submitted to the CE (a) an extensive data compendium containing copies of all field and laboratory forms and analytical results along with site-specific locational data, and (b) a photographic notebook comprising the photographic record of the project and containing negatives, contact prints, slides, and representative black and white enlargements.

The objectives of the project were (a) to develop a problem-oriented research design appropriate both to the specific needs of the Test Track Survey and to future archeological work in the Holloman region, (b) to conduct an intensive archeological survey for the purposes of identifying all surface-evident historic and prehistoric cultural remains in the one by two mile Test Track Impact Area, and (c) to evaluate and make significance recommendations concerning the cultural resources located in the course of the survey, and their implications for future cultural resource management on HAFB. The results of the survey, in conjunction with the research issues identified in this report are designed to enable the CE to assess the scientific significance of the cultural resources present in the impact area, to determine their eligibility for inclusion in the National Register of Historic Places, and to begin formulating a cultural resource management program for cultural remains on Holloman Air Force Base. OCA's emphasis in the project has been on linking current research issues and accurate field observations for the purposes of developing appropriate evaluation criteria for both the present and future work in the Holloman area. In so doing, OCA has relied heavily on the results of recent OCA research in the Border Star 85/GBFEL-TIE project areas some 60 km to the south (Seaman et al. 1986; Anschuetz and Doleman 1988a, 1988b; Schutt and Chapman 1988).

The present report includes (a) a discussion of the project area's past and present environment and geomorphological concerns relevant to understanding cultural resources in the area (Chapter 2), (b) a review of current and previous research issues and their implications for the Test Track Survey Area (Chapter 3), a detailed description of the survey and laboratory methods (Chapter 4), substantive results of the survey (Chapter 5), and an evaluation of the research significance of the sites and isolated manifestations recorded on the survey, together with suggested modifications to the original research design, and an assessment of the potential impacts of Test Track activities on the resources (Chapter 6).

Project Area Description

Holloman Air Force Base is located in the Tularosa Basin about 8 miles (12.8 km) west/southwest of the city of Alamogordo, New Mexico, near the eastern margin of the vast White Sands gypsum dune complex. The boundaries of White Sands National Monument lie immediately to the west and southwest. The High Speed Test Track Facility is located on the northern end of the base and extends over 50,000 feet (almost 10 miles or 16 km) to the north/northwest across the basin floor. The Test Track itself consists of a set of three oversized rails which are absolutely straight and flat, not even conforming to the earth's curvature. The Test Track Facility was originally constructed in the mid-1950s. It has been incrementally extended since then to its present length. Rocket sleds are mounted on the track and used by several branches of the military to test ejection systems, weapons delivery systems, and the effects of high speeds and impacts on a variety of hardware. In addition, the HAFB Explosive Ordnance Disposal unit uses the area just north of the end of the Test Track to explosively destroy unusable rocket motors. Some of the most famous experiments at the Holloman Test Track were conducted in the late 1950s and involved the effects of rapid acceleration and deceleration on the human body.

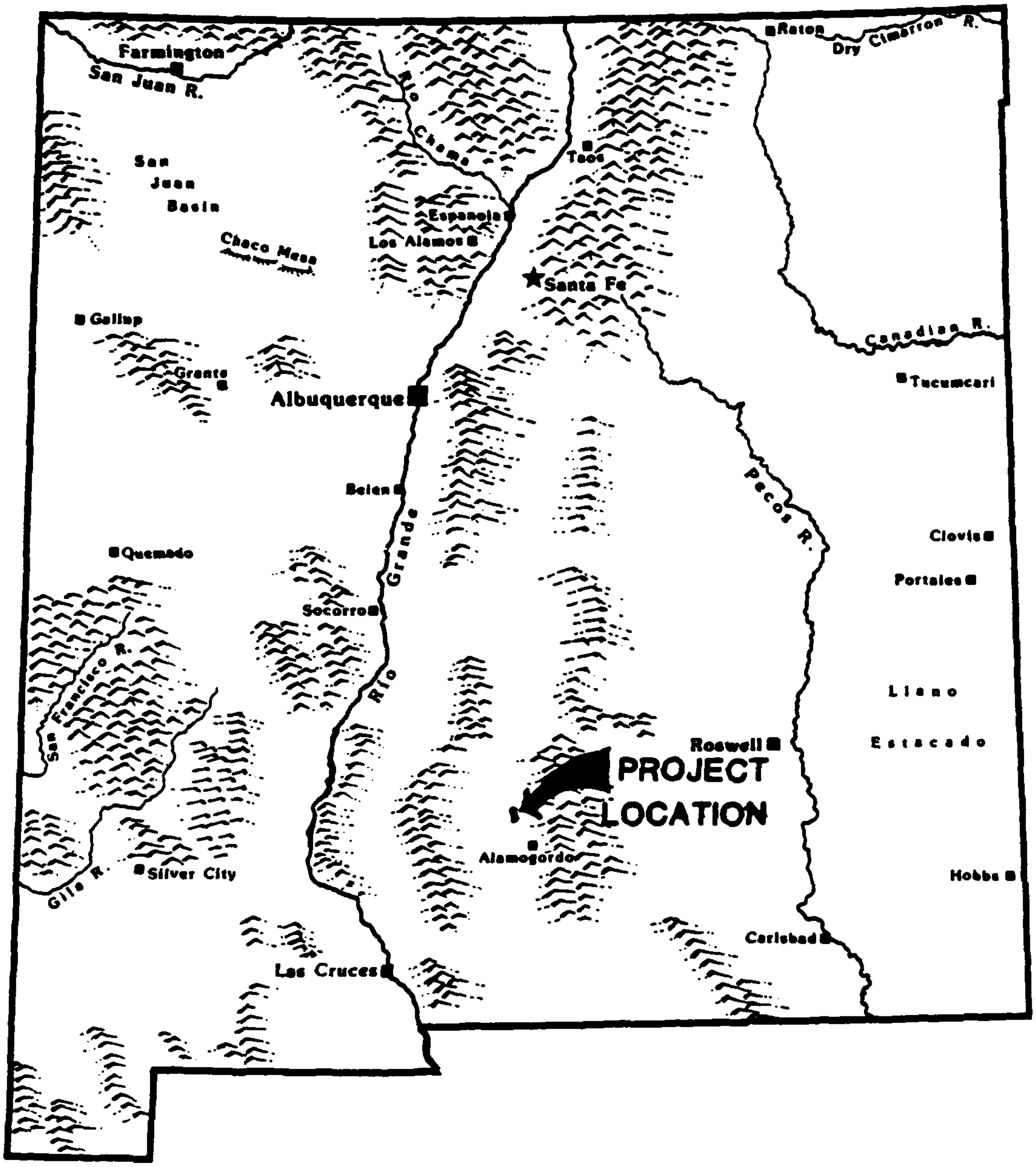


Figure 1.1. Test Track Survey Project Area Location

While much of the activities conducted at the Test Track occur only on the track itself, many result in metallic items ranging in size from inches (shrapnel) to feet (rocket and sled parts) being projected off the end of the track and into the Test Track impact area. On impact, these items are capable of significantly disturbing the upper 6 inches to 3 feet (15 to 100 cm) of the surface soils. In addition, explosive destruction of rocket motors ejects metal shrapnel and unburned rocket fuel across the same area. Thus, ongoing Test Track activites have the potential to damage cultural resources in the Test Track impact area.

For the purposes of the present survey, the impact area was defined as a 1 by 2 mile area (1.6 by 1.6 km) oriented approximately 2.5^{o} west of north (aligned with the Test Track centerline) lying at the north end of the test track and comprising 1280 acres (518 ha, Figure 1.2). Most of the land is unplatted; however, the impact area corresponds to Townships 14 and 15 South, Range 8 East, and the northern end occupies portions of Sections 34 and 35, Township 14 South, Range 8 East. Approximately the northern 68 percent of the impact area (873 ac, 353 ha) is under the jurisdiction of White Sands Missile Range; the rest is property of Holloman AFB. UTM coordinates (Zone 13) for the surveyed impact area appear in Table 1.1.

Table 1.1 UTM Coordinates for Corners of Test Track Impact Area

Corner	UTM Easting	UTM Northing
SW	390760	3654280
NW	390580	3657520
NE	392220	3657640
SE	392380	3654380

Brief Summary of Survey Results

The Holloman Test Track Archeological Survey was originally expected to encounter less than six archeological sites. It was also anticipated on the basis of Eidenbach and Wimberly's (1980) work at White Sands National Monument that the presence of significant eolian dune deposits in the survey area might indicate higher densities of cultural remains. This possibility was confirmed by the survey.

Altogether, 8 prehistoric and 2 historic (1940/1950s) sites and 55 isolated manifestations (plus 25 prairie-dog towns) were recorded in the course of the survey. Of the ten sites, nine are within the surveyed area, and one lies just outside and was discovered during the process of boundary location. Due to the site's proximity to the survey area and the presence of several well-preserved hearths and large ceramic sherds, the site was briefly recorded and mapped in the field, and assigned a Laboratory of Anthropology site number in the lab.

Of the eight recorded prehistoric sites, three (LA 67585, LA 67587, and LA 67588) are lithic sites of unknown age ("Lithic Unknown"), two appear to be Late Archaic in age (LA 67589 and LA 67591), and three are Formative (probably late) in age (LA 67592, LA 67593, and LA 67594; the latter not in the survey area). All of the sites are relatively small--rarely exceeding 100 m (330 ft) in maximum dimensions--and contain low densities of artifacts (chipped stone and occasionally a few ceramics), fire-cracked rock (FCR), and definite or possible fossilized gypsum hearth casts. All evidence at least some wind erosion. In the course of the survey, extremely limited auguring of site deposits was used in an attempt to determine the presence of buried materials or organic stains. None of the auger holes yielded positive results. Nonetheless, in the opinion of the author, at least limited buried deposits are present at all but the historic sites.

The two historic sites are both isolated surface trash dumps which probably date to the earliest military use of the White Sands area in the 1940s. Both probably represent early military use of the area, and are possibly related to the use of the Guilez Springs area just northeast of the impact area to house refugee German scientists following World War II.

No Paleoindian, Apachean, or Anglo/Early Hispanic sites were encountered.

Isolated manifestations recorded on the survey consisted of 14 lithic artifacts, 22 fire-cracked rock and/or fossil hearth features, 23 historic artifact occurrences, and 25 prairie dog towns. (The latter were recorded to aid in environmental planning as a clue to the potential occurrence of the black-footed ferret in the project area.)

Important results of the survey include the following:

(1) There is a significant association between the existence of semi-stable gypsum dune deposits and prehistoric archeological remains. This is true for all time periods represented. Both late Archaic and Formative peoples appear to have made use of the gypsum dunes environmental zone.

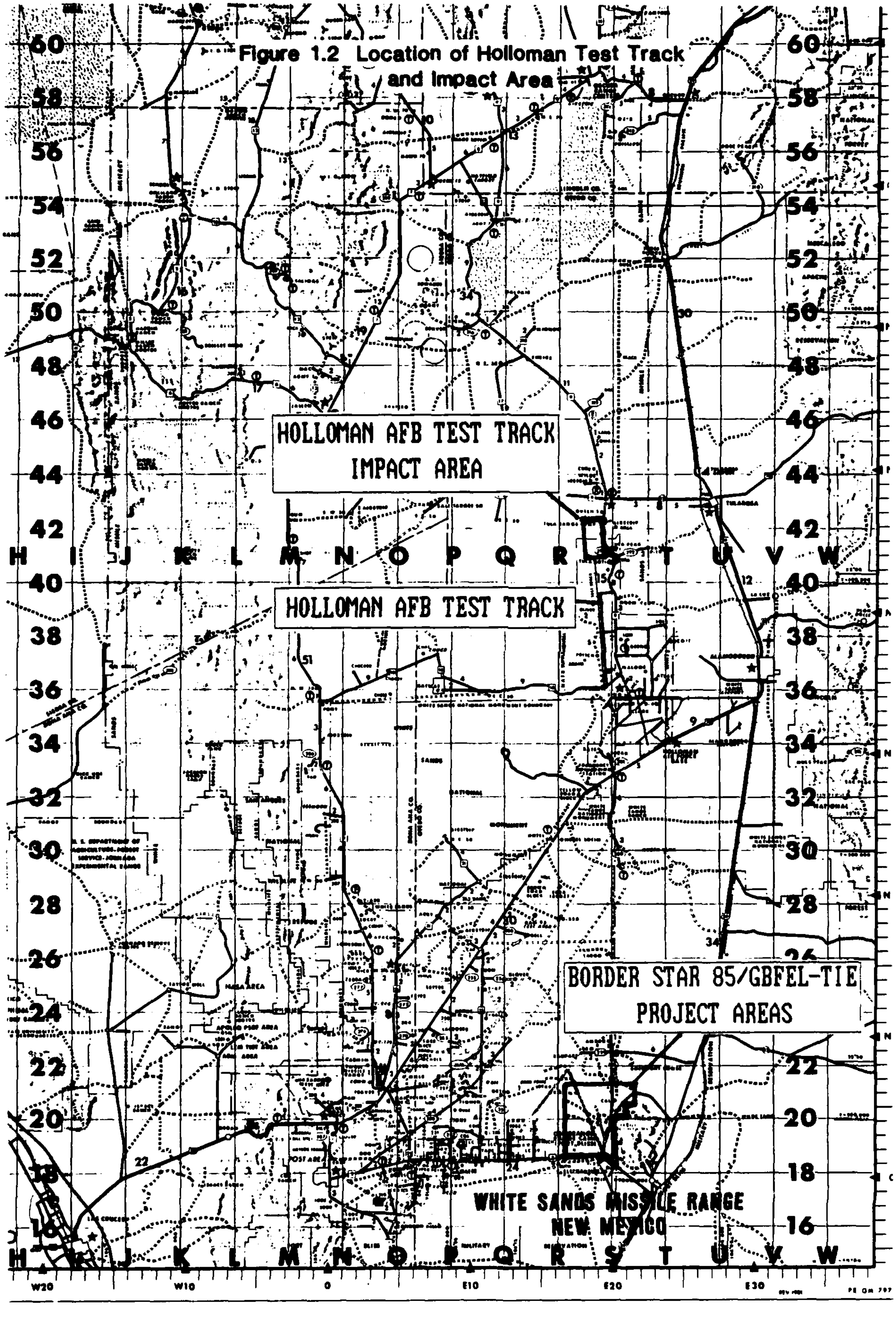


Figure 1.2 Location of Holloman Test Track and Impact Area
HOLLOMAN AFB TEST TRACK
IMPACT AREA
HOLLOMAN AFB TEST TRACK
BORDER STAR 85/GBFEL-TIE
PROJECT AREAS
WHITE SANDS MISSILE RANGE
NEW MEXICO
H I J K L M N O P Q R S T U V W
60 58 56 54 52 50 48 46 44 42 40 38 36 34 32 30 28 26 24 22 20 18 16
W20 W10 0 E10 E20 E30

(2) Lithic assemblages for the different time periods appear to differ functionally to some extent, suggesting differential use of the area, or different forms of technological organization.

(3) Lithic assemblages in the project area differ from those to the south in the Border Star 85/GBFEL-TIE project areas in terms of a number of different assemblage attributes, including (a) a near total lack of ground stone, and (b) somewhat different flake-to-angular debris ratios.

(4) "Fossilized" gypsum hearth casts--a phenomenon which had previously been recorded on only one other survey in the Tularosa Basin (Eidenbach and Wimberly 1980) are common in the survey area. Many of those recorded were dubious in nature, but their similarity to obvious charcoal/ash-stained features suggests that they, too, are hearth remnants.

(5) Auger testing conducted at recorded sites was not sufficient to confirm or deny the existence of buried cultural remains. Results of the auger testing were also insufficient for the purposes of evaluating the presence of a geomorphic/stratigraphic sequence similar to that documented for the Border Star 85/GBFEL-TIE project areas to the south. The Holocene geomorphic history of the area remains unknown.

(6) Prehistoric isolated manifestations are far rarer in the Test Track impact area than in the Border Star 85/GBFEL-TIE project areas, and the general distribution of prehistoric remains appears to be far more discrete than in those areas. This fact may be due to either behavioral or geomorphological factors, or both. Potentially important factors include (a) the presence of eolian sand-stabilizing cryptogamic lichens in much of the impact area's level topography, (b) the apparent surface stability of these deposits, and (c) the overall accretional nature of basin floor deposits.

(7) Based on in-the-field observations, present test track activities constitute a distinct potential threat to cultural resources in the area. Exposed portions of most of the sites are currently undergoing erosion and are relatively fragile-- especially the many fossil hearths noted.

(8) OCA recommends that, given the probability that Test Track activities will continue, a program of combined surface collection, testing, data recovery, and archival research be instituted at certain sites in order to mitigate the potential adverse effects of ongoing Test Track missions and natural processes. Specific recommendations are presented in Chapter 6.

The Test Track survey represents a miniscule portion of the Tularosa Basin, and is hardly representative of even the dune periphery portion of the White Sands area documented by Eidenbach and Wimberly (1980). Nonetheless, the survey results further confirm the association between eolian gypsum deposits and prehistoric cultural remains. In addition, the survey results indicate that the prehistoric materials in the Test Track impact area can contribute to our understanding of past human adaptations on the basin floor by providing a picture which can be contrasted with that emerging in the Border Star 85/GBFEL-TIE project areas to the south, and with data from better known archeological remains in the peripheral environmental zones of the basin.

Finally, the impact area contains historic resources which may represent an important aspect of the area's history: early post-war activities.

Chapter 2

PROJECT AREA ENVIRONMENT AND GEOMORPHOLOGY

General Considerations

The Test Track project area lies on the floor of the central Tularosa Basin which in turn lies in the Mexican Highlands section of the Basin and Range province (see Noyes et al. 1986 and Anschuetz and Noyes 1988 for a more detailed discussion). The principal landforms of the Basin and Range province are north/south-trending tectonic features consisting of relatively parallel, narrow, uplifted fault block mountain ranges separated by downthrown basins characterized by thick, primarily alluvial sediments of Pennsylvanian and later age. The Basin is bordered on the west and east sides by the San Andres and Sacramento Mountains respectively. This mountain periphery and the associated piedmont slopes play a critical role in most models of prehistoric adaptations in the Tularosa Basin region (e.g. Hard 1986; Carmichael 1986b; Whalen 1980).

The Tularosa Basin floor is warm (mean annual frost free season, 220 days), arid (less than 250 mm annual precipitation), and internally drained by ephemeral streams which originate largely in the mountain periphery. The present surface is characterized by little standing water, although numerous ephemeral lakes and playas ranging in size from less than an acre to several km (e.g. Lake Lucero) are present. Most precipitation is highly localized as the result of isolated warm season convective storms, and thus local productivity is extremely variable from year to year. Diurnal temperature variations are great (as much as 50 degrees) throughout the year.

The predominant wind direction is from the west/southwest and wind speeds are greatest in the spring. Together, wind, high temperatures, and variable low precipitation combine to create an environment characterized by high evapotranspiration rates and typical desert scrub species such as creosote, mesquite, saltbush, yucca, sagebrush and a variety of annual forbs and grasses. The specific composition of vegetation communities varies across the basin floor as a function of local soils, topography, availability of runoff, human use, and climate (wind and precipitation).

In spite of its arid and desertic nature, the basin floor exhibits brief periods of high biotic productivity associated with periods of increased precipitation, especially in the spring and early summer of "good" years. Edible plants common to the basin floor include saltbush, yucca, mesquite, and rice grass (Eidenbach and Wimberly 1980:8). In addition, the desert vegetation supports an abundance of small fauna including reptiles, lagomorphs, and small rodents, although faunal communities also vary locally.

Specific Characteristics

The Test Track survey area lies 25 to 30 km from the nearest mountain range, and the only significant topographic feature in the project area is Tularosa Peak, an intrusive volcanic formation capped with limestone which rises 300 m (984 feet) above the surrounding basin floor. Tularosa Peak is not sufficiently massive to serve as a source of orographically induced precipitation, and contains no known active springs. The volcanic and contact-metamorphic materials of the mountain probably served prehistorically as raw material sources for both hearth stones and chipped and ground stone tool manufacture.

Two ephemeral lakes and associated feeder streams are located near, but not within the survey area: Brazel Lake (terminus of Tularosa Creek) is located ca. 3.5 km to the north/northwest; the White Sands Lakes (Allen Draw) lie just west of the northern end of the Test Track and just southwest of the impact area (Figure 2.1). Both of these ephemeral lakes were presumably present and important in prehistoric times.

In addition, both saline and fresh water springs are known to occur in the project area. These springs are fairly common on the basin floor and last for varying amounts of time before disappearing and reappearing elsewhere. The most prominent among these are Guilez Springs and Barrel Springs which lie just north of the survey area. Both are man-made and thus played no role in prehistoric adaptations in the area. Their presence, however, indicates that a freshwater aquifer is very close to the surface in the area and suggests the possibility that freshwater springs may have been present prehistorically. No evidence for saline or freshwater spring was found within the Test Track survey area, but an area of probable soil pipes was found in the east central portion of the survey area. Such pipes are probably Pleistocene in age (Gile et al. 1981), and may have had prehistoric significance (Schutt and Chapman. 1988). No prehistoric cultural remains were found in association with the soil pipes in the impact area, however.

Figure 2.1 Test Track Impact Area and Environmental Zones

Tularosa Peak 7.5 min Quadrangle (1981) Scale 1:24,000

Finally, the Test Track impact area lies at the northeastern periphery of the vast complex of gypsum dunes derived from Lake Lucero and ancient Lake Otero known as *White Sands*. A significant feature of the western half of the survey area is a series of semi-active to active, loosely connected dunes which trends north/northeast. These dunes are probably Pleistocene in age, as evidenced by the presence of Quaternary-age archeological materials. The general dune mass is parabolic in shape, and smaller parabolic forms (100-300 m across) which are aligned with the prevailing wind direction (WSW/ENE) are evident as well. These dunes typically consist of a pair of trailing "arms" which converge to a "point" on the leeward side.

In an archeological reconnaissance of White Sands National Monument (Eidenbach and Wimberly 1980), an area of semi-stabilized parabolic dunes separating the main gypsum dune mass from the alluvial plains to the east and northeast was noted as containing the highest overall diversity of plant and animal species and also some of the highest site densities in the entire Monument (Archaic through Pueblo). Although somewhat more isolated, the dune mass in the impact area is clearly part of the same phenomenon and is characterized by the same increase in vegetative diversity, and many of the same species (Plates 2.1, 2.2).

The rest of the Test Track impact area corresponds to the topographically flat *valley fill* biotic/physiographic community of Eidenbach and Wimberly's (1980) report, an area which was not inspected during their survey. These portions of the survey area are comparable to topographically similar areas within Holloman AFB (Rayl 1987a, 1987b, 1987c, 1987d, 1988). Areas of both stable eolian sheet sands and active arroyo alluvium are also present.

Based on field observations of topography, vegetation and surface conditions, the Test Track impact area can be divided into three or four environmental zones, each with particular biological, hydrological and geomorphological characteristics (Figure 2.1).

Semi-active to Active Gypsum Dunes

Vegetation in the gypsum dune zone consists of *Yucca* (sp.), mormon tea (*Ephedra* sp.), sand sagebrush (*Artemisia, filifolia* or *frigida*), mesquite (*Prosopis* including ricegrass (*Oryzopsis hymenoides*) and giant dropseed (*Sporobolus giganteus*). Numerous other unidentified forbs and annuals are present also, and probably represent a similar vegetative community to that detailed in Eidenbach and Wimberly (1980:8-9). The area characterized by this topography is mapped by Neher and Bailey (1976) as the *Duneland-Yesum* soil association. The components of this association consist largely of active gypsum dunes and Yesum soils in the level areas between semi-stabilized dunes.

The age and geomorphic history of these dunes is unknown, but they appear far more active than the rest of the impact area surface deposits. Surface conditions in the dune area range from extremely active on the dunes themselves (little or no vegetation) to nearly stable on the level areas (Yesum soils) of the interior or windward sides of the distinctly parabolic dunes.

The dune zone presents a topography ranging from rolling, semi-stable deposits to distinct parabolic-form dune fronts with typical trailing "arms" which enclose a dune floor area characterized by relatively flat, stable eolian deposits. Maximum relief is about 5 m. Parabolic-form dunes typically exhibit a "focus" point or "nose" where the trailing arms converge and where the stabilized floor surface gives way to the more active deposits of the windward dune slopes (see cover photo). The hydrologic characteristics of the dunes are unknown, but they are likely to act as excellent retainers of moisture.

Stable and Semi-stable Upland Flats

Most of the Test Track impact area is characterized by the relatively flat topography which is found on much of the basin floor. Due to the long term tectonic controls on basin deposits, deeper sediments in the impact area are essentially alluvial in nature. Surface deposits, however fall into three classes in the survey area: (a) active dunes (above), (b) eolian sand sheet deposits, and (c) active fluvial deposits in ephemeral channels (see below). Those areas of the basin floor in the Holloman area which are not occupied by either active dunes or active fluvial channels tend to be characterized by a stable mantle of eolian materials which extends to an unknown depth. These deposits probably represent reworked basin fill, and in the survey area appear to consist almost entirely of extremely fine gypsum sands. The surface topography of these deposits is very gently rolling to extremely flat (1-2 m maximum relief) and exhibits occasional depressions which may qualify as "playas" or ephemeral ponds (Plate 2.3).

Field observations indicate that the surface of these deposits is stabilized by a mat of lichens or *cryptogams* which ranges from spotty to nearly continuous in certain areas. These lichens are mentioned by Neher and Bailey (1976:51) as a component of their *Vegetative Group 4* which is characteristic of both the Duneland-Yesum soil

Plate 2.1. View West of dune periphery zone from upland flats zone

Plate 2.2. Typical semi-stable dune vegetation

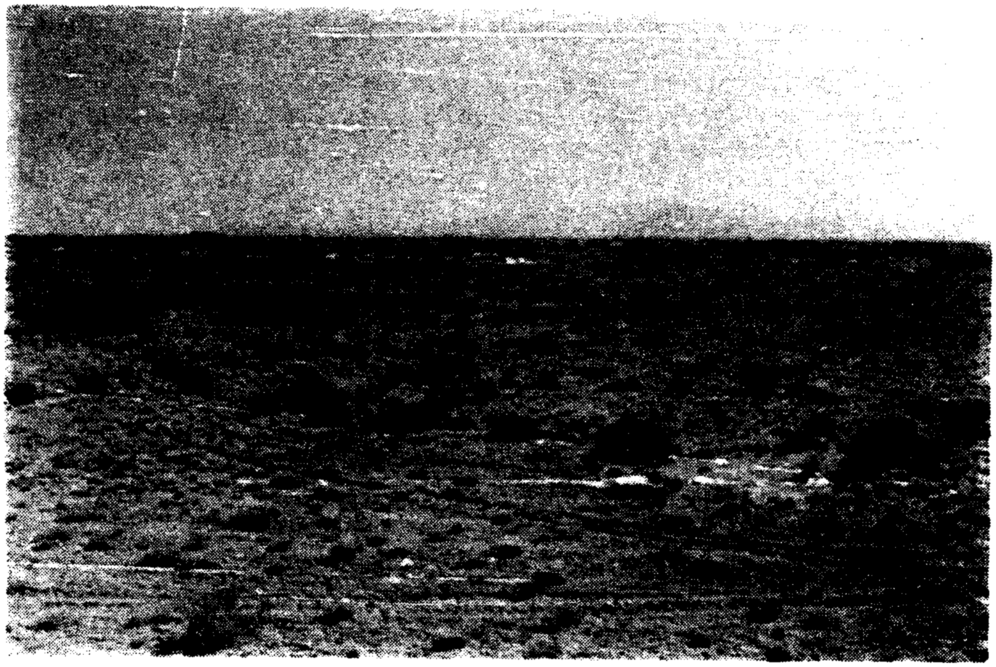


Plate 2.3. "Playa" southwest of LA 67591

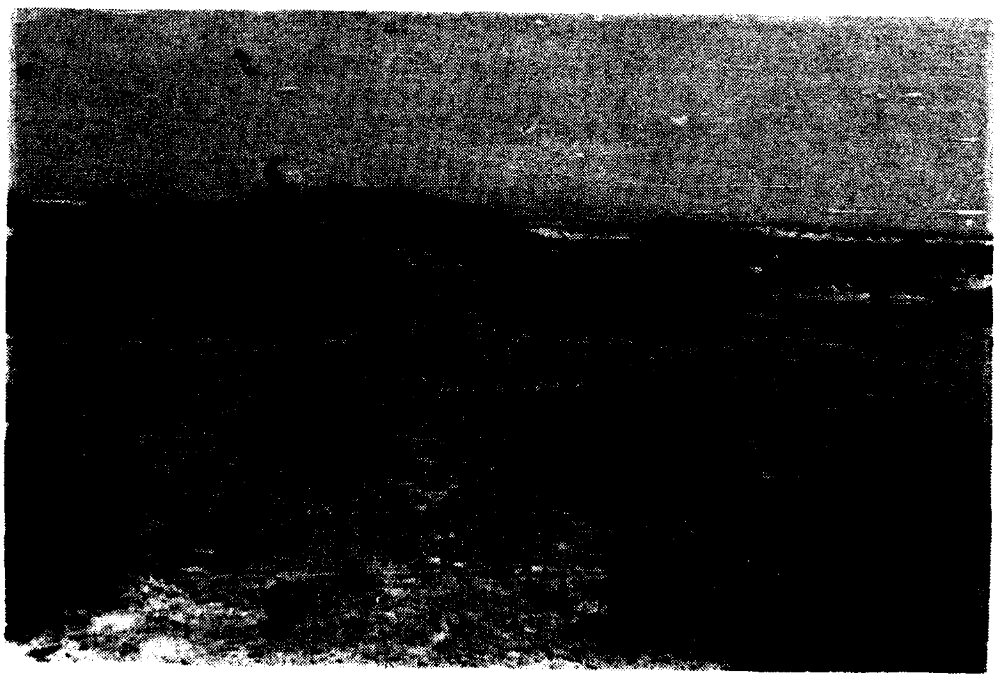


Plate 2.4. Lichen-stabilized "mini-dunes" on floor of parabolic dune interior

association of the parabolic dunes (level dune interiors) and the Yesum-Holloman association which characterizes the upland flat zones. The broader flats on the windward sides of the gypsum dunes exhibit the greatest degree of stabilization, followed by the southern portion of the upland flats east of the dune zone (Figure 2.1, Plates 2.4 and 2.5). The northern portion of the upland flats exhibits a markedly lower density of these soil-stabilizing lichens.

Vegetation in the upland flats is dominated by saltbush (*Atriplex* sp.), mormon tea (*Ephedra* sp.), ring muhly grass (*Muhlenbergia torreyi*), mesquite, and several species of *Opuntia*. Where the lichens are less abundant, the vegetation is also correspondingly sparser. This is most evident in the northern portion of the upland flats.

The accumulative nature of basin deposits, together with the stabilizing effect of the lichens suggests the possibility that archeological remains in the upland flats zone may be wholly or partially buried and thus incompletely represented.

Drainage Bottoms

The drainage bottom zone is present only in the southeastern portion of the survey area and consists of extremely flat silty and clayey alluvial sediments characteristic of low-slope, ephemeral water courses (Neher and Bailey's [1976] *Meade silt loam* soil). The bottom of Allen Draw lies an average of 4 m below the level of the adjacent upland flats and is separated from the uplands by an uneven, eroded drop-off, indicating that the Draw has been incised into the surrounding basin deposits. Because of this, archeological materials were expected to be rare, if present at all, in the drainage bottom zone.

Vegetation in the drainage bottoms consists largely of greasewood (*Sarcobatus* sp.) and saltbush, some ring muhly grass, and a variety of weedy annuals (Neher and Bailey's [1976] vegetative group 2). Surface deposits often exhibit characteristic desiccation features.

Almost all of the bottom of Allen Draw in the vicinity of the end of the Test Track has been repeatedly disturbed by vehicular traffic, grading and other earth-modifying procedures. Given the alluvial nature of the deposits, damage to cultural remains is probably minimal.

The Test Track impact area is located in the middle of the Tularosa Basin floor in an area characterized by relatively level topography broken by gypsum dunes. Local vegetation is desert scrub throughout, but exhibits significant variation depending on topography and geomorphic context. Although the survey area appears to contain only one significant topographic feature--the parabolic dune zone---it lies among several other physiographic features of potential prehistoric and historic significance: ephemeral lakes and feeder streams to the north and south, the White Sands to the southwest, and Tularosa Peak to the southeast. The area may thus be thought of as an ecotone of sorts, and, given the frequently presumed association between high environmental diversity and increased densities of archeological remains (e.g. Reher and Witter 1977; Irwin-Williams 1985; Irwin-Williams et al. 1988), it offers the potential to yield significant archeological data. (Note: Based on data from the San Juan Basin of northwestern New Mexico, Moore and Winter [1980:360-363] have argued that this association only partly explains Archaic settlement patterns, and that proximity to reliable water sources is also an important factor).

Project Area Geomorphology

Recent work in the Border Star 85 and GBFEL-TIE project areas some 40-60 km south of the Test Track survey area has produced a significant increase in our understanding of both the geomorphology of the southern Tularosa Basin, and the relationship between Holocene eolian geomorphic processes and the surface visibility of archeological remains (Schutt and Chapman 1988; Doleman 1988c). As the result of an intensive geomorphological study conducted as a part of the GBFEL-TIE project (Blair et al. 1988; Doleman 1988b), a Holocene stratigraphic sequence of four sedimentary units and associated paleosols representing terminal Pleistocene times to the present has been identified in the general area and correlated with a well-known sequence of eolian and alluvial units in the neighboring Rio Grande Valley (Gile et al. 1981).

Whether or not the Border Star 85-GBFEL-TIE geomorphic sequence is applicable in the Test Track area is not known, nor have current project activities provided definitive answers. Because the geomorphic events reflected in this Holocene stratigraphic sequence represent large-scale climatic changes, and because the sequence has been extensively identified (from Las Cruces to Alamogordo) it is possible, if not probable, that the stratigraphy of the Test Track project area can eventually be correlated with better known stratigraphic and paleosol units to the south. Neher and Bailey's (1976) soil survey of White Sands Missile Range, provides accurate and useful information concerning modern soil classifications, but does not discuss paleosols, stratigraphic units, or the geomorphic history of the studied area. While the modern soils in the Test Track area are different from those of the Border Star 85-GBFEL-TIE project area (*Duneland-Dona Ana Complex*, Neher and Bailey [1976]), the geomorphic units

Plate 2.5. Close-up of lichen-stabilized cryptogamic soils in same location as Plate 2.4

may well be the same.

The stratigraphic unit and paleosol sequence identified in the Border Star 85-GBFEL-TIE project area and its implications for archeological studies is described elsewhere in great detail (Blair et al. 1988; Doleman 1988b, 1988c). The results of these studies are briefly summarized here.

With the exception of the oldest and stratigraphically lowest unit (designated Q1, and which includes late Pleistocene lacustrine deposits), all the units are essentially eolian in origin. In the area studied, the surface is characterized by a large-scale eolian sand mound/deflation depression topography with a smaller scale coppice dune topography superimposed. The depressions are often associated with ephemeral channel mouth ponds much like those found north and south of the Test Track impact area. Most of the observed surface archeological materials are associated with the topographic highs, either as a result of differential settlement patterns or possibly due to burial by recent sediments in the lower areas. This larger-scale mound/depression topography developed during the erosion of the next lowest unit (Q2) and initial formation of the following unit (Q3) during early to mid-Holocene times. The smaller-scale coppice dune topography formed in recent times as the result of an erosion event which began no more than ca. 100-150 years ago following a period of relative surface stability and desert grassland vegetation (as evidenced by a relict A soil horizon capping the Q3 unit). This recent erosion is responsible for the deposition of the latest stratigraphic unit (Q4).

All known intact archeological materials documented to date are associated with the Q3 unit (estimated dates: 7300-100 BP), and much of the extant surface archeological record in the area is undoubtedly the result of recent (Q4) eolian erosion. Similarly, where the Unit Q3 sediments have yet to be exposed, and/or where recent eolian sedimentation has buried an older surface, archeological remains are not surface-evident, and the surface record is correspondingly biased.

Both the small-scale coppice dune and larger-scale sand mound/deflation depression eolian topographies of the Border Star 85-GBFEL-TIE study area are essentially absent in the Test Track survey area. Instead, the land surface in the Test Track impact area and surrounding it appear to alternate among more clearly defined topographic variations: large, active gypsum dunes; rolling, stable eolian (upland) flats; and flat drainage bottoms and ephemeral lakes.

An explanation of the differences between the two areas awaits more detailed geomorphic studies. Two possible factors, however, suggest themselves: (a) the existence near and "upwind" of the Test Track survey area of the White Sands dune complex with its peculiar chemistry and eolian dynamics, and (b) the presence in the survey area of extensive lichen-stabilized or *cryptogamic* soils. Lichens, such as those of the Holloman-Yesum soil series are not present in the Border Star 85-GBFEL-TIE project areas to the south where the coppice dune topography is a function of the ubiquitous and moisture-hungry mesquites (Neher and Bailey 1976). Whether the presence of the lichens, the lack of abundant of mesquite, and the resulting greater stability of the surface sediments is related to the chemistry of gypsum soils, or to some other factor is unknown.

Nonetheless, the apparent stability of surface sediments in the Test Track impact area has important implications for archeological integrity and visibility. If the Border Star 85-GBFEL-TIE Holocene stratigraphy is applicable, then the Q3 sediments may be largely intact, with the Q4 unit being absent or consisting soley of a veneer of wind blown sands. If so, archeological remains in any such area would be visible only in areas of recent erosion. As such, the near absence of surface archeological materials from the stable upland flats in the Test Track impact area is extremely interesting.

Given the important relationships between archeological visibility, integrity, and eolian geomorphic processes, one question which it was hoped the current work effort could address, in at least a preliminary fashion, was whether or not evidence exists to support or refute a correlation between the geomorphic units described for the Border Star 85-GBFEL-TIE project area and similar units in the Test Track survey area. Unfortunately, the limited augering data gathered during the Test Track Survey was insufficient to answer these questions. Nonetheless, general topographic differences between the two areas suggest that, whereas the former area is characterized by high frequency variations in the visibility and intactness of archeological remains, the Test Track impact area may be dominated by larger-scale topographic variations.

As noted above, if this preliminary model is correct, then the most intact remains are expected to occur in the upland flats where fairly stable depositional regimes have pertained for long periods of time. Such archeological deposits--if they exist--are also expected to be largely buried and difficult to locate. Archeological remains in the drainage bottoms are not anticipated, and any materials discovered are likely to have been disturbed and/or buried by fluvial processes. Finally, archeological materials in the gypsum dunes zone may be either buried or exposed, depending on the specific geomorphic histories

of the dunes in which they occur

Another important implication of the differences between the Border Star 85-GBFEL-TIE project area and the Test Track area topographies and geomorphologies lies in their potential to affect surface archeological distributions differently. Recent research on the GBFEL-TIE project indicates that the spatial structure of the archeological record of the Tularosa Basin floor is nearly continuous. The results of the Test Track survey suggest quite the opposite. Whether geomorphic or behavioral factors are responsible for the difference is a significant question for future research in the Test Track area to address.

Chapter 3

RESEARCH ISSUES AND QUESTIONS

Research Orientation

As the result of a recent increase in the number of cultural resource management projects in southern New Mexico, many areas which were originally defined archeologically 30-40 years ago have been updated by more modern research perspectives. One such area in New Mexico includes the Tularosa Basin, the Hueco Bolson, and neighboring portions of the southern Rio Grande Valley (Mesilla Bolson and Jornada del Muerto) which have received attention as a result of extensive military use of large areas and other government activities, along with more academically-oriented research. Although most work has occurred in the southern portion of the basin floor (Beckes et al. 1977; Whalen 1977, 1978; Carmichael 1983; Hard 1983a, 1983b, 1986; Skelton et al. 1981; Seaman and Doleman 1986), productive research has also been conducted in more environmentally-varied portions of the northern basin as well (Laumbach 1985; Laumbach and Kirkpatrick 1985; Wimberly and Rogers (1977); Kelley 1966). Among the most important of these is the survey of Wimberly and Rogers (1977) which comprised a sample survey of five physiographic and biotic zones in the Three Rivers drainage ranging from the basin floor, through the lower and upper valley, to the slopes and crest of the Sierra Blanca mountains. This project was conducted in a broad area located just north and northeast of the Test Track impact area.

These projects have led to the formulation of regional settlement models which generally emphasize seasonal transhumance and a continuing significant role for wild resource utilization, during even the Formative period of increasing agricultural subsistence (see below). At least one other major non-government project has also taken place in the general region (Kelley 1966) since Lehmer (1948) first defined the Jornada Branch of the Mogollon. During this period of extensive survey and limited excavation, archeologist's perceptions of both problems and methodology have changed significantly as the science has grown.

The Border Star 85 (survey, Seaman et al. 1986) and GBFEL-TIE projects (survey, Anschuetz and Doleman 1988a; testing, Schutt and Chapman 1988; and limited excavations, Swift et al. 1988) conducted on White Sands Missile Range are the most recent example of large-scale archeological work conducted in the basin. These projects have changed the focus of recent research by shifting to an emphasis on questioning the nature of the archeological record and the processes responsible for its formation. The GBFEL-TIE project includes some of the first excavations ever to be conducted on the basin floor. Prior to this, almost no excavation data were available to evaluate survey-based reconstructions of basin floor use. Among the important findings of these excavations is the documentation of small but unmistakeable residential structures (Swift et al. 1988).

Prior to the Border Star 85 and GBFEL-TIE projects, recent archeological projects concentrated either on surveys of the basin floor and periphery zones or on excavation of substantial residential sites located primarily in the periphery. More *assumed* than documented in most of this work, is the notion that the basin floor was used principally as a marginal foraging resource area, and that its prehistoric significance was limited and changed little through time. This interpretation was supported by the apparent fact that the basin floor was characterized almost entirely by small, low-density, non-diagnostic artifact scatters which were easily interpreted as small foraging camps. Many were deemed insignificant and received little if any analytical attention. Anschuetz (1987) and Doleman and Anschuetz (1988) provide extensive critiques of previous survey methods and analytical approaches.

Beginning with the Border Star 85 survey (Seaman et al. 1986), OCA archeologists began to arrive at two conclusions: (a) the archeological record is not easily divided into neat management packages consisting of episodic clusters of cultural remains, and (b) the obviously active eolian environment strongly conditions the visibility of the extant archeological record and is responsible for false site boundaries. These realizations, combined with assessments of the effects of survey methods on the archeologist's perceptions of surface distributions have led, through the analysis of existing data, to a better understanding of the nature of the archeological record in the area. A variety of disturbing conclusions and questions have been produced by this research.

First, most transect survey methods (a) involve high-speed walking between *sites* in areas of extensive low-density distributions, (b) consistently underrepresent the surface archeological record, and (c) yield a biased record of artifact variability. Traditional survey methods tend to

emphasize and reinforce an unrealistic perception of the archeological record as consisting of easily bounded sites, surrounded by low density isolate distributions containing largely specialized tools and other obtrusive artifact types (Anschuetz 1988c; Doleman 1986, 1988a). Short of careful and methodical inspection of the entire ground surface, there is probably no way to eliminate this innate bias in which artifact discovery probabilities are an inverse function of both overall density and the speed of the walking archeologist (Doleman 1988a). By simply recognizing the problem, however, traditional survey methods can be adjusted to ensure discovery of low density materials at least at periodic intervals (see Section 4, below).

Second, in the Border Star 85 and GBFEL-TIE project area at least, the archeological record is not limited to the cultural remains visible in modern blowouts, but extends into the adjacent dune sands at almost all site locations (Schutt and Chapman 1988).

On the basis of this research, conventional perceptions concerning the archeological record on the basin floor have been seriously challenged. The results of this research indicate that these perceptions are flawed by two unwarranted assumptions about the behavioral and natural formation processes responsible for the archeological record. The first assumption is that past human activities were sufficiently localized in time and space that their record consists of easily defined, more or less contemporaneous assemblages, usually subsumed under the *site* rubric. The second assumption is that surface archeological distributions are essentially isomorphic with and representative of a better-preserved subsurface archeological record.

The results of the Border Star and GBFEL-TIE surveys (Seaman et al. 1986; Anschuetz and Doleman 1988a) suggest that the archeological record on the basin floor is not only more extensive than previously recognized, but the product of different forms of behavior and organization than implied in the traditional site concept and in the results of traditional survey analyses such as those of Whalen (1978) and Carmichael (1986b). Since these assumptions are critical to and implicit in previous surveys, their conclusions about prehistoric use of the basin should also be questioned (Anschuetz 1987).

An example of these perceptual problems can be found in the common notion that Formative peoples farmed the alluvial fans along the basin periphery while utilizing the inner basin solely for foraging. The GBFEL-TIE survey, on the other hand has revised this picture substantially, by (a) documenting large sites, probably structural and residential, associated with ephemeral drainage-mouth ponds on the basin floor, and (b) discovering that the so-called *Alluvial fans* are actually a loess deposit covered by desert pavement, and are much less likely to be supportive of agriculture than originally thought (Anschuetz 1988d).

Thus it is argued that, before cultural remains on the basin floor can be reliably interpreted or their significance assessed, the true nature of the archeological record should first be determined, and erroneous assumptions and inappropriate methods should be adjusted accordingly. This issue formed the heart of the research design developed for the GBFEL-TIE project, including the testing and excavation phases (Doleman 1987a).

The most recent work in the Tularosa Basin has thus been less concerned with competing models of prehistoric subsistence and change than with fundamental methodological issues. The effects of behavioral and natural formation processes, together with the biases inherent in traditional survey methods, have contributed to at least two serious misconceptions concerning the archeological record of the basin floor: (a) the record is more or less discrete, consisting of small, easily identified foraging camps, and (b) cultural remains on the basin floor are limited in extent, variety and abundance.

The Border Star 85 and GBFEL-TIE projects have demonstrated that cultural remains in the basin are more continuous, abundant, and variable than heretofore realized, and that different behavioral and interpretive models are required to understand how surface and subsurface assemblages reflect prehistoric utilization of the basin environment. The fact that overall surface/subsurface artifact densities are on the order of 25-30 times higher than indicated by previous surveys (Doleman 1988c), suggests that prehistoric use of the basin floor was far more substantial than earlier surveys have indicated.

Research in the Test Track survey was concerned with identifying cultural resources relevant both to understanding prehistoric (and historic) land use, and to improving our ability to recognize and interpret the archeological record. The foremost question was whether or not the spatial structure, content, and context of the Test Track cultural resources bear any resemblance to those encountered to the south, and thus whether the same or different behavioral and natural formation processes appear to have been operative.

Culture History and Previous Research

The history of the central Tularosa Basin and the Holloman/WSMR area specifically consists of six major prehistoric and historic periods (Laumbach and Kirkpatrick 1985; Wimberly and Rogers 1977): (a) PaleoIndian (ca. 12,000-7000 BP), (b) Archaic (ca. 7000 BP-AD 300), (c) Formative (or ceramic; AD 300-1400), (d) late prehistoric and historic Apache (AD 1600?-1870), (e) Anglo/Hispanic (ca. AD 1870-1945), and (f) Military use (AD 1945-present). The discussion below emphasizes the prehistory of the area largely because only a very small proportion of the cultural resources found on the Test Track survey can be positively associated with periods other than the prehistoric or military use periods.

Prehistoric Research

In culture-historical terms the Tularosa Basin belongs to the Jornada Branch of the Mogollon culture (Lehmer 1948) which also includes the Jornada del Muerto north of Las Cruces and east of the Rio Grande. In all likelihood this cultural designation was originally made because of the ubiquitous brownware (brown and red wares are common in the Mogollon area as well), the presence of intrusive Mogollon ceramic types, and the lack of any distinctive similarity to archeological cultures to the east (LeBlanc and Whalen 1980). Yet the Jornada branch, never matched the cultural heights of their mountainous Mogollon neighbors, and the Formative period (including the Early and Late Mesilla Phases: ca AD 200-1000, the Dona Ana Phase: AD 1100-1200, and the El Paso Phase: ca AD 1200-1400) failed to culminate in a basin-and-range counterpart to the classic Mimbres Phase.

A general picture of the prehistory of the Tularosa Basin (and thus the Jornada Mogollon) has emerged in recent reviews (Anschuetz 1988a; Laumbach and Kirkpatrick 1985; Wimberly and Rogers 1977; Whalen 1978; Hard 1983a, 1986; Carmichael 1986b). (Note: the work of Kelley [1966] is not discussed here as it largely relates to the eastern slopes of the Sierra Blanca and the Pecos River valey, rather than the Tularosa Basin).

To start with, PaleoIndian hunters made at least occasional use of the area during the early Holocene (ca 10,000-7,000 BP), presumably exploiting large game and plant resources. PaleoIndian sites are known from several locations in the Basin (Beckett 1983), and this, in conjunction with the discovery of a distinctive PaleoIndian assemblage on the Border Star 85 survey (Elyea 1986) indicate that PaleoIndian use of the Basin may have been comparatively extensive. No PaleoIndian sites and very few diagnostic artifacts were discovered in the surveys of Laumbach (1985), Laumbach and Kirkpatrick (1985), or Wimberly and Rogers (1977) to the north of the project area. Wimberly and Rogers 1977 also note that the visibility of PaleoIndian sites may be low in the region.

Evidence for Archaic use of the region from ca. 7,000 BP to post-AD 1 (as late as AD 300, Laumbach and Kirkpatrick 1985) varies. The Archaic period can be divided into Early (ca. 7000-4000 BP) and Late (Ca. 4000 BP-AD 300) periods. Carmichael (1983:12-13) notes a relative paucity of reported Archaic materials in the Ft. Bliss area to the south. On the other hand, the numerous Archaic and Archaic-like points documented on the Border Star 85 survey (Seaman et al. 1986) suggest that occupation of the area was substantial. Both the Early and Late Archaic periods are represented, although later types are prevalent (O'Hara 1986). The earliest radiocarbon date from the GBFEL-TIE project excavations--4075 +/- 120 BP (Beta 23924/ETH 3660)--is one of several early dates from the same site. Wimberly and Rogers (1977) report almost no evidence of Early-Mid Archaic occupation in the Three Rivers drainage, while Laumbach and Kirkpatrick (1985) recorded evidence of fairly continuous, albeit ephemeral, occupation of the Sargent York project area west of Carrizozo throughout the Archaic period.

Archaic adaptations in the Tularosa Basin are characterized as based largely on broad-spectrum exploitation of seasonally available plant resources and small fauna, opportunistic hunting of large game, and high residential mobility (Wimberly and Rogers 1977; Whalen 1980; Carmichael 1986b; Laumbach and Kirkpatrick 1985; Anyon 1985). This picture of Archaic adaptations, however, has been largely inferred from reconstructions in other areas and from southwestern ethnographic data (e.g. Basehart 1973), rather than from analysis of local archeological materials. Perhaps the most complete data are those from Fresnal Shelter near Tularosa (Human Systems Research 1972).

The remaining periods of Tularosa Basin prehistory are collectively referred to as *Formative* and include three temporal phases (Lehmer 1948):

(1) The Mesilla phase, or Pithouse period, dates ca AD 200- 1100 (LeBlanc and Whalen 1980).

(2) The Dona Ana phase represents either a short-lived (AD 1100-1200) transitional period between the terminal Mesilla phase and the later El Paso phase (Lehmer 1948; Carmichael 1986b), or an accidental

interpretation of mixed ceramic assemblages on multicomponent sites (Seaman 1986).

(3) The El Paso phase or Pueblo period--AD 1200-1400--is the last documented extensive occupation in the region (Carmichael 1983; LeBlanc and Whalen 1980). Available evidence suggests a rather marked shift in settlement patterns and economic focus from previous periods.

The current picture of cultural and economic change in the Tularosa Basin during the mid-late Holocene is one of slowly increasing population and an exceedingly gradual change in the economic base from hunting and gathering to increasing reliance on cultivated products. An early form of maize dated to 1665 B.C. has been reported from Fresnal Shelter (Human Systems Research 1972; Carmichael 1982), indicating the early introduction of cultigens to the area. The transition from essentially Archaic forms of subsistence (i.e. foraging supplemented by varying amounts of cultigens) to village agriculture (the El Paso phase) apparently required some 1500 years to accomplish, and has been viewed variously as the product of *cultural succession* (Wimberly and Rogers 1977), or of cultural evolution and the interaction of demographic and environmental factors (Hard 1986; Carmichael 1985, 1986b; Mauldin 1986; Whalen 1981).

A significant increase in the importance of agriculture for the Pueblo Period is seen in a restructuring of settlement patterns, together with an architectural change from pithouses (which may have been present as early as the late Archaic) to the construction of true pueblos, and a sharp increase in the importance of cultigens in botanical assemblages (Whalen 1981). Available data indicate a change in Formative period settlement patterns from more or less dispersed small residential sites distributed throughout the Basin floor and mountain periphery zones, to larger, more aggregated settlement and the construction of true pueblos on the alluvial fans at the edges of the basin.

The early Formative or pithouse period is well represented in the Border Star 85, GBFEL-TIE, and Ft. Bliss (Carmichael 1986b; Whalen 1980) survey data in the form of early, late, and indeterminate Mesilla Phase ceramic assemblages. Wimberly and Rogers (1977) suggest that most of their lithic unknown sites, along with numerous ceramic scatters (with and without hearths and/or ground stone), and a few ceramic villages date to this period. In the Sargent York survey area at the exteme northern end of the Tularosa Basin (Laumbach and Kirkpatrick 1985) ceramic-bearing populations apparently occupied the area only during a brief period of extensive (versus intensive) horticulture, ca. AD 900-1050.

The late Formative period is also well represented in the survey data from the southern portion of the basin, in the form of both ceramic scatters and villages. As noted earlier in this chapter, the results of the GBFEL-TIE survey may indicate the presence of true residential sites on the basin floor along the larger drainages in association with ephemeral ponds, as well as on the so-called *alluvial fans*. Large, probably structural, sites similar to those from the Ft. Bills area, were also recorded in the fan zone of the Jarilla mountains during the Border Star 85 survey (Seaman et al. 1986). In the Three Rivers drainage, settlement patterns appear to concentrate increasingly in the upper portions of the valley during the late Formative period, a pattern reminiscent of those in the southern portion of the basin and one which Wimberly and Rogers (1977) argue represents increasing reliance on intensive forms of agriculture.

In spite of this shift-to-agriculture scenario, most researchers have been quick to note that foraging, especially in the summer months, continued to play an important role even in late Formative times. Recent excavation data support this contention (Whalen 1980; Carmichael 1986a, 1986b). Hard (1986) explains the persistence of foraging subsistence as a function of the relatively high vegetative turnover rates (net annual production divided by biomass) of desert grasslands such as those of the basin floor.

Phase-specific models for seasonal mobility have been proposed for the Archaic (Wimberly and Rogers 1977), the Mesilla phase (Hard 1983a), and the Pueblo period (Dona Ana and El Paso phases; Mauldin 1986). All are rather static models in that they tend to ignore inter-annual variability in resource productivity (generally high in arid environments) and the potential effects of this factor on both behavior and assemblage content. All have at their core the postulation of seasonal movement from the mountain areas--occupied in the Fall and Winter--to the Basin floor in Spring and Summer.

Finally, all have in common two elements which are common throughout current research in the Southwest: (a) ethnographic analogy in the interpretive mode described above, and (b) the use of site assemblages (especially survey data) as the basic unit of analysis. In fact--in recognition of differences in settlement patterns--the three models differ only in the role of agriculture. In short, little is known about Archaic or Formative period settlement, subsistence, or demography that could not be inferred solely from external sources.

In summary, previous prehistoric research in the Tularosa Basin has been concerned primarily with determination of settlement pattern variations (especially during the Formative periods), with refining chronologies, and with the development of ethnographically based models for seasonal mobility and subsistence. Little emphasis has been placed on improving the understanding of how the archeological record was formed, or how it might best be recovered or interpreted, and the applicability of research methodologies drawn from other archeological contexts has been assumed.

In addition, although previous researchers have concluded that the floor of the Tularosa Basin was used largely for seasonal foraging, none have tested this hypothesis. Furthermore, with the exceptions of recent work on the Border Star 85 and GBFEL-TIE projects the majority of previous survey and, most importantly, excavation has concentrated on the more productive and varied environments of the basin periphery where permanent and semi-permanent water sources are far more common. Thus comparison of the Test Track impact area with the results of most previous research may be of limited utility. Perhaps the most significant aspect of the cultural resources of the Test Track area lies in theri potential to address questions concerning prehistoric use of the basin floor.

Historic Periods

Although direct archeological evidence is currently lacking, ethnographic and archival data suggest that the Athabaskan progenitors of the present-day Mescalero Apache arrived in the Tularosa area ca. AD 1600 (Kelley 1966), or possibly in the late 1500s (Schroeder 1973). Although at least one early Spanish expedition visited the area in the late 1500s, the Three Rivers drainage north and east of the Test Track survey area was a Mescalero stronghold and an impediment to Anglo/Hispanic settlement in the region until the early 1870s when the Mescalero reservation was established in 1873 (Wimberly and Rogers 1977). The confinement of the Mescalero to the reservation opened the region up to settlement, and was the result of--among other defeats--a decisive battle which took place in 1868 at Round Mountain (another name for Tularosa Peak), just to the east of the Test Track impact area (Wimberly and Rogers 1977).

Archeological sites representing historic Apachean occupation in the area are extremely rare, and no definite prehistoric Apachean sites are known. Wimberly and Rogers (1977) found five sites located in the upper portions of the Three Rivers drainage which contained both chipped stone tools and debitage and early historic artifacts. They suggest that these sites represent historic Apache camps, but they were unable to positively identify any prehistoric Apache sites, even though some were likely present in the survey area.

Ethnographic data (Basehart, 1973) indicate the both the historic Apache, and presumably their prehistoric forebears, pursued a semi-nomadic subsistence similar to that hypothesized for Archaic period peoples (Wimberly and Rogers 1977). This pattern involved the exploitation of all the Tularosa Basin biotic zones, including the basin floor, and thus it is quite possible that Apache sites occur in the Test Track area, and that some of the lithic unknown sites recorded during the survey are in fact, Apachean in orogin. The oldest datable historic materials recorded on the survey (bullet cartridges at LA 67588 dating to the mid-late 1800s) may represent either historic Apache or Anglo/Hispanic activities (see Chapter 5).

Following confinement of the Apaches to the Mescalero Reservation, the Anglo/Hispanic occupation of the Tularosa and Three Rivers areas--which began in the early 1860s with a handful of families from the Rio Grande Valley--expanded rapidly. The principal economic activities were farming and more importantly ranching (sheep, goats, and some cattle). Homesteads were located on sources of reliable water, while herds were grazed across as much territory as individual ranchers could control (Wimberly and Rogers 1977).

This "family ranching" economy persisted until ca. 1906 when a successful businessman from Las Cruces--Albert B. Fall, who later became a New Mexico senator and Secretary of the Interior--began to buy up large quantities of the Three Rivers Valley. Fall's purchases, together with newly-enacted grazing laws which opened public lands up to grazing rights, gave Fall greater control over most of the range, and smaller family ranches began to fail and were gradually subsumed by Fall's operation. At the same time, the railroad and increasing industrialization allowed Fall to build numerous water control projects and bring much of the Three Rivers Valley under cultivation, and soon much of the Three Rivers population was employed by Fall.

Following the Harding administration's Tea Pot Dome scandal in which Fall was involved, Fall's operation failed, the area economy went into decline, and much of the population moved out during the depression years (the above discussion is drawn from Wimberly and Rogers 1977:458-462). Not until the advent of various military activites including the establishment of White Sands Proving Ground, did the area economy pick up. The greatest effect of the military presence has been felt in the

cities of Alamorgordo and Las Cruces, however, rather than in Tularosa and Three Rivers.

Current Research Issues

As noted above, most recent research in the Tularosa Basin has been concerned with the biases inherent in survey data, together with a recognition that both the dynamic eolian geomorphic environment and the diffuse nature of most basin floor subsistence activities have combined to produce an archeological record which is generally underestimated and misinterpreted by traditional survey methods (Doleman and Anschuetz 1988). Recent testing and excavations (Schutt and Chapman 198?; Swift et al. 1988) indicate that behaviorally meaningful distributional patterning is evident not only in larger-scale survey data (Anschuetz et al. 1988; Chapman and Doleman 1988), but at the smaller excavation scales. These results suggest that while foraging activities are responsible for the generally diffuse character of the basin floor record, more focused activities--including processing and residence--are also present (Doleman 1988c).

At the core of the issues raised by recent research lies the difficulty of defining synchronic "episodic" assemblages under the natural and behavioral conditions which prevail in arid environments (Ebert 1986; Doleman 1985; Foley 1981). By revising perceptions of the true structure of the archeological record on the basin floor, and of the formation processes responsible for it, recent research has offered a more viable approach to identifying and interpreting archeological assemblages. The elements of this approach are listed below. The particular applicability of this perspective to cultural remains in the Test Track impact area and the Holloman AFB area in general are discussed in Chapter 6.

Site/Isolated Manifestation Distinctions

The semi-continuous nature of both surface and subsurface basin floor distributions is evident in the results of both intensive surface recording survey (Seaman et al. 1986) and excavations (Swift et al. 1988). This fact, combined with the realization that most surface sites are geomorphically conditioned samples of more extensive cultural remains precludes the easy definition of assemblages for analysis (Doleman and Anschuetz 1988). Thus, while the terms "site" and "isolated manifestation" (or "isolate") are useful for management purposes (Chapman et al. 1985), their value to interpretation and analysis is far more limited.

Behavioral Formation Processes

Previous reconstruction of prehistoric settlement and subsistence patterns in the Tularosa Basin region have been based largely on analysis of extensive survey and some excavation data. These analyses have failed to question critical assumptions concerning the validity of surface assemblages and the kinds of human behavior they represent. Analyses of survey data (Doleman 1987b) suggest that surface assemblages in the Border Star 85-GBFEL-TIE project area conform more to a model of redundantly occupied small camps and extractive litter than to one of residences and camps alone. As an alternative to the assumption that the archeological record consists of easily defined sites, Doleman (1987a) has offered a model of formation processes which suggests that variations in the structure and content of archeological distributions across the landscape can be accounted for in terms of environmental factors which condition human resource extraction, processing and consumption, and the organizational constraints which govern the locations of these activities. This approach has been labeled the study of *organized entropy* (Doleman 1985).

Geomorphic Formation Processes and Interpretation of Surface Data

Much of the Tularosa Basin floor geomorphology is dominated by eolian processes. These have strongly affected the character of the surface archeological record (Doleman 1988b), and evidence exists that some subsurface materials have also been affected by geomorphic, biological, and/or pedogenic processes (Doleman 1988c). Although extensive eolian sand accumulations are present in the Test Track impact area, the degree to which their topographic structure and governing geomorphological processes differ from those in the Border Star 85-GBFEL-TIE project areas to the south is currently unknown (Chapter 2). Given these consideratons, a concern for the effects of natural processes on the visibility and interpretation of surface remains is warranted. The survey and analysis methods used on the Test Track project (Chapter 4) were designed to avoid both bias in the survey results and erroneous interpretations of surface assemblages.

Differences between the Border Star 85-GBFEL-TIE project area and geomorphic conditions in the Test Track project area suggest that detailed geomorphological studies may be required in order to completely assess the overall context and integrity of cultural remains in the Test Track impact area. The environmental zones defined in Chapter 2 are thought to provide a preliminary geomorphic classification which reflects at least gross

variations in geomorphic factors affecting surface visibility. The implications of these different contexts for surface visibility are discussed in Chapter 6 in light of the survey results.

Determination of Site Age and Function

An expected consequence of the high residential mobility and foraging activities proposed for much of the basin floor's prehistoric occupations is that most archeological assemblages will reflect extremely limited activities, short-term occupations, and frequent revisitation over the long periods of time represented in the relatively thin recent Holocene deposits (Unit Q3 of the Border Star 85-GBFEL-TIE sequence). Thus, many locations can be expected to contain either no chronologically diagnostic materials, or assemblages whose chronological affiliation can be questioned. One example is the continuing debate over the validity of the Dona Ana Phase, a "cultural phenomenon" which may well be more a function of survey techniques and the nature of the archeological record than one of prehistoric change (Anschuetz and Seaman 1987). Excavation may be the only context in which truly synchronic assemblages can be safely identified.

Similarly, many smaller assemblages lack diagnostic tools and consist solely of debitage, fire-cracked rock and/or fragmentary ground stone. Such assemblages are by far the most common on the basin floor.

These problems are a function of the nature of the occupations, and not a reflection of the intrinsic value of the cultural resources for understanding prehistoric adaptations. The archeological record of the basin floor represents a poorly understood component of regional subsistence systems, one which is generally acknowledged as important even during agricultural times, but which continues to receive little analytical attention. Only through analysis of distributions of numerous such small assemblages, combined with excavations of selected locations, can we begin to understand the past human behavior which produced them (Schutt et al. 1988).

In addition, the recent work on the Border Star 85 and GBFEL-TIE projects indicates that previous models of agricultural use of the basin floor and adjacent alluvial fans may be in serious error, and that agricultural activities may have focused as much or more on the larger ephemeral ponds than on the fans (Anschuetz 1988d). Thus portions of the basin floor may have had far greater prehistoric significance than previously acknowledged, and many "undiagnostic" assemblages may relate *not* only to foraging but also to agricultural activities.

The issue of how to deal with the numerous small sites characteristic of much of the basin floor without using traditional methods of analysis for determining site chronology and function has yet to be resolved. Relegating small sites and their associated low density distributions to categories such as "lithic unknown" is unproductive at best. A more rewarding approach lies in utilizing knowledge of formation processes to develop more realistic analytical methods based on more secure assumptions (e.g. Chapman and Doleman 1988).

All of the prehistoric sites documented on the survey qualify as small sites dominated by lithics, fire-cracked rock and occasional features (hearth remnants). For management and comparative purposes, the sites have been classified into convenient temporal categories on the basis of diagnostic artifact types present (Chapter 5). The use of such categories is not meant to imply that the sites are ***known*** to represent one temporal period or even one occupation.

Project Area-specific Research Questions

The issues discussed above led to the formulation of a number of questions which the Test Track survey methods were designed to address, and which--with appropriate modifications based on the survey results--may serve as a useful focus for initial research in the Holloman area. Underlying the questions listed below is the belief that the relevance of cultural remains in a small area such as the Test Track impact area to regional issues can best be evaluated only after they have been compared and/or contrasted with materials from similar, nearby areas.

Unfortunately, with the exception of the the Border Star 85 and GBFEL-TIE surveys, and those on the Ft. Bliss military reservation (Carmichael 1983, 1986b; Whalen 1977, 1978, 1980), little comparative data is available from the basin floor. Although a portion of Eidenbach and Wimberly's reconnaissance of White Sands National Monument (the *Dune Periphery*and adjacent *Valley Floor*) is essentially identical to the Test Track impact area, their survey was too limited to permit settlement pattern analyses or extensive comparisons.

Previous surveys generally evince two areas of concern or problem orientation: (a) methodological and theoretical issues concerned with the nature and interpretation of the archeological record, and (b) questions concerning settlement patterns and subsistence economy. While neither issue can be deemed more important than the other, critical elements of the former must be addressed

before data from the basin floor can contribute significantly to the latter. The Border Star 85 and GBFEL-TIE project areas to the south of the Test Track imppact area represent the nearest substantial archeological research which has taken place in environmental conditions similar to those in the present survey area.

Based on these considerations, the following questions are designed to provide a general framework within which to evaluate the cultural remains of the Holloman Test Track impact area:

(1) Are surface distributions in the Test Track survey area similar to those in BS-85-GBFEL-TIE areas in terms of overall attributes of density, aggregation, and variety/assemblage size relationships?

(2) Do surface distributions show similar topographic patterning? Is the same suite of landforms present, or if not, what landforms are present, and do archeological remains exhibit spatial patterning with respect to them?

(3) Does the GBFEL-TIE project area Holocene stratigraphy--or some variation thereof--extend north to the Test Track survey area? If so, what are overall and specific geomorphic contexts of Holloman cultural resources in terms of surface visibility and subsurface context?

(4) What prehistoric periods appear to be represented in the survey area? Does evidence of different periods show patterning with respect to identifiable landforms or environmental features?

(5) What kinds of excavation contexts are present to help determine site function (e.g. features, intact activity loci)?

(6) What kinds of excavation contexts are present to help determine site chronology?

(7) If function and chronology can be determined or suggested, how might survey sites be used to augment or revise current settlement models? Specifically, are cultural remains in the project area consistent with the notion that the basin floor was used primarily for foraging? Is there any evidence for residential camps or more permanent habitations (e.g. horticultural sites) associated with the ephemeral streams which run through the northern and southern end of the project area?

(8) What data are present in the survey area to address or refine extant chronologies (i.e. rim sherds, datable points, Dona Ana phase sites)?

(9) Although several interesting physiographic features exist in the vicinity of the Test Track survey area, previous survey in the immediate Holloman AFB area (Rayl 1987a, 1987b, 1987c, 1987d, 1988; Kirkpatrick 1986), suggests that overall site and artifact densities will be considerably lower than those to the south. If so, what environmental characteristics of the survey area are most likely to be responsible for the relative absence of cultural remains?

The survey results appearing in Chapter 5, together with an increased understanding of the Test Track impact area environment and geomorphology, have provided preliminary answers to most of these questions.

Chapter 4

Survey and Analysis Methods

Introduction

In keeping with the Scope of Work provided by the CE, the purpose of the Test Track survey was to locate, record, and evaluate all cultural remains in the Test Track impact area which "can be reasonably detected from the surface". Information was recorded in the field as accurately as possible so that the cultural resources discovered can be (a) evaluated for significance in accordance with the criteria outlined in 36 CFR 60.4, and (b) integrated into the research design in order to make it more specific for the Holloman Area. Methodological issues defined in the research design (Chapter 3) were taken into account in the design of the survey.

This chapter describes the survey and recording methods used during the survey as well as the elements of the analytical goals of the various laboratory analyses. The basis for significance evaluation and recommendations is presented in Chapter 6. These methods and goals, together with the original research design, formed the core of the Plan of Work submitted to the CE prior to the initiation of field work. Some of the methods described anticipate cultural occurrences (such as large, dense or complex sites or historic buildings) which were not encountered on the survey. They are nonetheless presented here because they represent part of OCA's approach to the Holloman survey, and as a potential guide to future survey on Holloman AFB.

Examples of the field forms and coding guidelines used during the field portion of the survey are reproduced in Appendix 1.

Survey Methods

Coverage

Throughout the survey one crew of four to five individuals walked parallel east/west transects spaced at 15 m intervals across the entire area to be inventoried. Due to the fact that, with the exception of the parabolic dune area, the terrain was relatively flat, transect distances were fairly easy to maintain, and the use of small amounts of flagging to mark the "lead" transect on each pass helped immeasurably in maintaining straight, evenly spaced transects.

In order to maximize artifact and feature discovery rates at the 15 m interval, crew members were encouraged to leave their transect whenever it was deemed necessary for the purposes of confirming the presence of cultural remains. In addition, as an experimental means of increasing discovery rates in low density areas (Doleman 1986, 1988a) the crew halted briefly on a periodic basis (every 50-100 m) for much of the survey.

Interestingly, none of the few isolated manifestations recorded were discovered during these "stop and look around" periods. The results of the survey suggest that the low density archeological remains which are so common in the Border Star 85/GBFEL-TIE project areas to the south are rare to nonexistent in the Test Track impact area. The failure of the"stop and look around" strategy to discover any cultural materials tends to support this conclusion. Whether or not the strategy would be successful in areas with more common low density materials remains to be determined.

All prehistoric and pre-1950 historic remains encountered were recorded. Five major categories of cultural remains were used for initial classification purposes: (a) chipped stone, (b) ground stone, (c) ceramics, (d) fire-cracked rock/caliche, and (e) features (ash stains, hearths, visible or suspected architecture). Upon discovery, cultural remains were evaluated and classified as either a site, or an isolated manifestation. The distinction between sites and isolated manifestations used in the field was based on *artifact variety* as a measure of *activity variety*, rather than on measures of density or intactness. This approach was favored because (a) variety is a simple but reliable assemblage attribute, (b) useful measures of density are to be made only at sites, and (c) intactness is a variable attribute of sites, and not a defining characteristic.

Generally, the isolated manifestation category was limited to isolated artifacts and small artifact scatters (less than 15 m diameter) consisting of no more than one class of artifact or feature. Multiple sherds from the same vessel (a "pot drop"), or lithic debris from the same reduction event were included in the isolated manifestation category. On the other hand, it was anticipated that even a single flake occurring together with a single sherd, represents two distinct activities and might warrant site designation. In such cases auger testing and field observations of geomorphic context were to be used to ascertain the presence of buried cultural remains. Doubtful contexts of this sort

were not encountered, however.

In making the distinction between sites and isolated manifestations, the project director based decisions on direct experience gained during the survey. When multiple lithic material types or ceramic types were present, the *site* category was favored. Isolated manifestations were limited to three categories: (a) individual lithic artifacts and one instance of three thinning flakes of the same material; (b) individual or small scatters of historic artifacts (less than 10); (c) isolated fire-cracked rock artifacts or scatters and/or isolated possible fossil hearths.

Isolated manifestations were recorded as they were encountered, and their locations marked on on the appropriate 7.5 minute USGS quadrangle (Tularosa Peak 1981). Fortunately, although aerial photography was not available, the Tularosa Peak map contains a photomosaic in addition to contour lines and other features and on-the-ground orientation was not particularly difficult. Site recording was performed only after the entire 1280 acre area had been transected (one exception occurred when sites were recorded on two mornings prior to evacuation for Test Track missions). This approach proved to be more efficient, in addition to allowing the earliest possible assessment of site recording needs.

Collections

Collection of cultural remains in the Test Track impact area was as limited as possible. Materials were to be removed under two conditions: (a) they are in danger from on-going natural or human disturbance (e.g. erosion, or military activities), (b) collection of unknown but typeable artifacts or other materials is deemed in the best interest of the scientific goals of the project (e.g. extremely important or unique artifacts such as a Clovis point). Under condition (a), if a small feature, or a few artifacts are in danger of loss due to erosion or human activities, they were to be collected during the course of the survey. In cases where multiple or complex features, numbers of artifacts, or whole or partial sites are in danger, the project director was to notify the CE of the situation, and no attempts at salvage were to be made.

In fact, only two artifacts were collected--both isolated manifestations: one early 20th century pop bottle, and one Archaic projectile point (both were recovered from WSMR property and will eventually be curated there). Also collected were samples of definite and possible fossil hearths for the purposes of confirmation and evaluation of archeomagnetic potential.

All collected materials were recorded on a field specimen catalogue, including site or isolated manifestation number, specimen number, and provenience number. Isolated manifestations were plotted on the topo map, and where necessary, compass readings were taken on prominent local features (principally Tularosa Peak and Guilez Springs). The only materials collected from sites were taken from hearth features marked on the site maps. Had any artifacts been collected, their exact provenience (distance and bearing from permanent site datum) would have been recorded on the field specimen form and marked on the site map.

Special Features of the Test Track Survey Area

Three features unique to portions of the Tularosa Basin floor which were expected to occur in the survey area are (a) old spring mounds, (b) "plaster of paris" hearth casts in the white gypsum sand dunes (Eidenbach and Wimberly 1980), and (c) prairie-dog towns. Old spring mounds represent former natural springs which have since ceased flowing due either to a drop in the water table or to having been plugged by accumulated sediments and evaporites. These features have been noted elsewhere on the basin floor, often with cultural remains in association, and presumably served as a prehistoric resource. None were found during the survey, although a cluster of probable soil pipes was found in the eastern upland flats (Chapter 2).

The hearth casts in the white sand dunes are a feature unique to gypsum sands and result from heating the gypsum and produces an anhydrate that becomes a crude plaster of paris when moistened by subsequent precipitation. Preservation of organic matter and behavioral evidence in these features is often remarkable (Eidenbach and Wimberly 1980:89). Numerous examples of both definite, charcoal/ash-stained and possible (hardened, erosion-resistant gypsum) hearth casts or "fossil hearths" were encountered. These features are discussed in Chapter 5.

Prairie-dog towns are less unique in themselves than they are important to identifying areas of particular attraction to the black-footed ferret, an endangered species. During the survey, those prairie-dog towns (25) which appeared to be currently active (open holes, fresh excavations) were located on the topo map and assigned isolated manifestation numbers 101-125. No specific data about the towns (size, number of holes, distribution) were recorded. Most towns averaged 10-30 m in diameter and 5-15 holes. Live inhabitants were seen only once. The excessive heat characteristic of all but the early morning hours was undoubtedly responsible for their general scarcity.

Documentation: Isolated Manifestations

As noted above, isolated manifestations were recorded as encountered, and their locations were marked on aerial photographs and topo maps. The 59 isolated manifestations were assigned sequential numbers (one series for the project overall), and recorded on Artifact/IO forms (Appendix 1). Six categories of information were recorded for prehistoric artifacts: (a) specific artifact type (specific lithic, ground stone, and ceramic type codes were used), (b) ceramic vessel form, (c) lithic material type, (d) other chipped and ground stone attributes: condition, cortex, platform type, and dimensions (L/W/T). Isolated features (fire-cracked rock and/or fossil hearths) were described and fire-cracked rock counts noted or estimated. Isolated pre-1950 historic artifacts and small scatters were recorded as isolated manifestations and relevant attributes (age, color of glass, function) were described on the IO/Artifact Recording Form. Topographic context and vegetation were not recorded in the field, but derived from inspection of the topographic map.

Documentation: Sites

Site Definition, Units of Recording, and Crew Activities. The principal goals for site recording were to provide consistently recorded data regarding site content and setting for the purposes of evaluating the site's research potential and significance. Specific recording activities towards these ends included:

(a) Defining and justifying the site's boundaries, locating the site accurately on maps of the survey area and in terms of the UTM system, and establishing a permanent site datum.

(b) Inventorying all site areas and features (architecture, hearths, artifact scatters) on a master site form and preparing a scale map of their distribution. (Laboratory of Anthropology Site Forms were filled out in the laboratory.)

(c) Describing the site's general cultural composition (components present) and relating it to the distribution of observed features.

(d) Describing the site's environmental setting and condition (preservation).

(e) Sampling designated site areas for artifact content using carefully chosen sample units and performing in-field analysis of the artifacts within them.

(f) Recording all site data in a predetermined format which is flexible enough to accommodate a variety of site types from small lithic scatters to larger, structural sites. Site data were also organized in a form which can be easily translated into that of the Archeological Records Management System (ARM) data files.

(g) Conducting auger tests to determine the site's subsurface extent and depth where necessary.

(h) Photographing the site's overall location and context and specific features and diagnostic artifacts.

(i) Collecting archeological specimens under certain circumstances (see above *Collections*).

Upon encountering a site, crew members, under the supervision of the project director, systematically walked the site for the purposes of discovering and delimiting various site features and areas such as architecture, hearths, depressions, and artifact scatters. Color-coded flags were used to mark different kinds of occurrence (e.g. different colors for lithics, ceramics, architecture, hearths, and historic materials and features). Where possible, all visible artifacts and features were flagged. The prehistoric sites encountered on the survey were all small enough that 100 percent of all lithic and ceramic artifacts were flagged; fire-cracked rock flagging fractions ranged from 33-100 percent. At historic sites, all rare or diagnostic artifacts were flagged, while more abundant types (glass fragments, cinders) were flagged only with enough flags to indicate their distribution.

In cases where artifact density was too high to allow 100 percent flagging (e.g. fire-cracked rock), flags were regularly placed at every n^{th} artifact (based on overall density). For lithics and ceramics, the usual *flagging fraction* was 100 percent, i.e. every artifact was flagged. Fire-cracked rock was usually flagged at 50-75 percent. Controlled flag sampling allowed general variations in artifact density and the limits of site artifact areas to be monitored. Unusual or "diagnostic" artifacts were always marked for later recording. The results of the flagging served as the basis for defining site boundaries, preparing a scale map of the site, and for dividing the site into analytical units for description and sampling purposes.

The primary level at which sites were subdivided was the *provenience*. This level was intended to represent spatially distinct units of the site which are more or less homogeneous internally and which, at least to some degree, can be correlated with "components" in the cultural description. Examples of possible *provenience* designations

include roomblocks, isolated structures (e.g. field houses, corrals), pithouse depressions, middens, isolated features (e.g. hearths, rock art), and distinct areas of artifacts, fire-cracked rock or closely-spaced features. In the Tularosa Basin floor, such units are often more arbitrarily determined by natural features such as sand dunes, and the most common type of provenience is the *blowout*. The provenience subdivision is usually limited to 40 m diameter maximum (Anschuetz 1988c). Given the lack of visible structures at any of the sites, provenience designations used in the Test Track survey were limited to spatially and/or topographically distinct artifact/feature localizations.

The provenience level of recording sufficed under most conditions. Although structurally complex sites were not encountered, had they been, proveniences could have been further divided into *features* for sampling and mapping purposes. Examples of *features* would include separate hearths in a scatter of hearths or ash stains, distinguishable rooms within a roomblock or standing structure, and separate petroglyphs in a rock art panel. An important consideration in the use of the *feature* analytical unit would be the project director's decision that further division of space--based on structural considerations rather than artifactual content--is required to achieve representative artifact sampling and/or to adequately describe distinct aspects of the provenience.

In the Test Track survey, the *feature* designation was used to distinguish distinct hearth features (fossil hearths, charcoal/ash stains) from more amorphous hearth evidence (e.g. possible fossil hearths, fire-cracked rock concentrations). Thus, the feature designation served to indicate those features which exhibit greater degrees of preservation and greater potential for radiocarbon dating and archeobotanical studies.

Once the site had been inventoried by inspection, a permanent site datum and a mapping baseline was established. The permanent datum point was marked with a metal (rebar) stake capped with a stamped aluminum cap containing the OCA field number. The permanent datum appears on all site maps and was used to piece-plot any collected materials. Site numbers were assigned sequentially within the project and consist of the letters "OCA" followed by the UNM proposal number (366), and the site's sequential number. Thus the recorded sites were numbered OCA:366-1 through OCA:366-9. (One site--OCA:366-10--was discovered outside the survey area and only briefly recorded; no site datum was established.)

Site recording consisted of four tasks:

(a) Preparing a site map which indicates the location of all defined *proveniences* and *features* and of artifact analysis samples.

(b) Filling out a Master Site Form (MSF) which describes and inventories the site's general content, setting, defined features, artifact samples, and recording records. Following the field work, the Master Site Form was used to fill out Laboratory of Anthropology Site Forms.

(c) Performing in-field artifact analysis of artifact samples chosen on the basis of defined proveniences and features and recording the results on the appropriate analysis forms.

(d) Ancillary activities (e.g. photography, radiocarbon sampling, augering). The resulting data package consists of a complete inventory of site features and artifact samples organized by *provenience* and, where applicable, *feature*. All artifact samples and locations (scatters and proveniences) are represented on the site map and inventoried on the MSF and sample inventory forms along with site-specific data concerning setting and condition.

Each crew member specialized in one or more of the above tasks. Initial inspection and flagging were conducted by all, but the various recording tasks (e.g. mapping, artifact analysis, writing forms) were the responsibility of particular individuals.

During the survey, it was the project director's responsibility to be certain that the site datum was placed and properly stamped, and that all site records, including the site map(s), artifact analysis forms, photographs, field notes, and collections (if any) and ancillary records were completed before the end of the recording phase. With the exception of the site datum, all flags and other site markers were removed once recording was complete.

Master Site Form. The Master Site Form records four major categories of information, consisting of both coded data and brief narrative sections, and includes all information necessary for filling out Laboratory of Anthropology Site Forms and ARMS Forms, including: (a) Site location, setting, and condition, (b) Site boundaries, composition, and components, (c) Artifact sample inventory, and (d) Field assessment of research potential and significance

Site Mapping. The site datum and baseline established during the initial reconnaissance of the site were used, along with 30 and 100 meter tapes and controlled pacing to create a *scaled sketch map* of the site and all identified

proveniences and features and major topographic and geomorphic variations. Flags placed during the reconnaissance greatly increased the efficiency of the mapping process, and rough accuracy rather than artistic quality was emphasized. Site maps were produced on graph paper by a designated mapping specialist with the assistance of other crew members. Areas associated with identified proveniences wereoutlined for the purposes of estimating provenience area, and all sample loci and artifact scatters were noted. The locations of all collected materials and auger tests, if any, were also noted.

For the purposes of comparability, a set of standardized map symbols were used (see Appendix 1). Along with the locations and identifying numbers of all proveniences, features, and artifact samples, the site maps contain both true and magnetic north arrows, the approximate scale, the mapper's initials, the date, and notes concerning areas of natural or human disturbance.

Artifact Sampling. Among the most important tasks in the site recording process was the choice of the locations and dimensions of in-field artifact analysis samples which reflect spatial diversity at the site, especially as structured by the distribution of site facilities such as hearths and architecture. The underlying assumption governing the methods was that, although a multitude of factors can be cited which contribute to site structure and spatial variation in artifact content, immovable site facilities are among the strongest and are generally the most visible to the field archeologist. "Scatter" designations were used in the absence of such features, or to include site areas which lacked them.

The IO/Artifact Recording Form was used for recording analyses of artifacts from sampled areas. The same general and specific categories of information recorded for isolated manifestations were recorded in the field for on-site artifact samples. Included on each form were the sample designation (Provenience number in all cases) which appears on both the MSF and the site map, the recorder's initials, and whether or not the artifact was collected and/or photographed. Collected artifacts and other materials, were placed in coin envelopes or larger packaging and marked with the site, provenience and feature and sample numbers, the location with respect to the site datum, the date, and the recorder's initials. All collected materials were entered on a field specimen catalog.

Standing pre-1950 historic structures were to be recorded on the New Mexico Historic Building Inventory Form. None were encountered.

Ancillary Activities. Ancillary recording activities conducted at sites included: (a) photography of features and artifacts, (b) augering of site deposits, and (c) collection of special samples such as samples of fossil gypsum hearths for archeomagnetic evaluation.

At a minimum, one photograph was made of each site showing the general setting and any visible major features such as hearths or topographic features. In addition, photographs were made of individual features at the discretion of the project director. Individual diagnostic artifacts (e.g. points, bifaces) were also photographed for later identification. Drawings of certain artifacts were also made as needed. All photographs were recorded on a photo log which contains the roll number, frame number, subject description (site, provenience, feature, artifact/sample number, and direction of view), type of film, photographer's initials, and notes concerning scale.

Exploratory augering of site deposits for the purposes of ascertaining the presence of subsurface remains and/or the geomorphic context of cultural materials was conducted as needed. A 2.5 inch sand auger was used and results (roughly 10 cm intervals) were recorded on an augering form along with locational data (Provenience number and feature associations, if any). All auger test locations were backfilled and marked on the site map. Any artifacts or other materials recovered were to be bagged as collected materials.

The augering conducted at sites located in the Test Track impact area failed to yield any evidence of buried cultural deposits. Augering, of course can only detect the *presence* of artifacts or stains, and is unable to prove indisputable absence--especially in the case of the limited augering conducted during the present survey. At least limited buried materials are nonetheless expected to be present. Another goal of the augering was to correlate results with the stratigraphic nomenclature of the GBFEL-TIE project area to the south (Blair et al. 1988). It seems likely that a better understanding of the Test Track area geomorphology is required to provide a framework for interpreting deposits at individual sites. Testing at certain sites would be a valuable means of determining whether or not buried materials are present, and how useful augering can be.

Laboratory and Reporting Methods

Analytical Goals. In general, the goals of the Test Track survey were to identify all surface visible cultural remains and to define the range(s) of variability present in the area in terms of age, function, content, and environmental context. As noted in Chapter 3, the foremost questions to be addressed concerned the relevance of the research

issues raised by the Border Star 85 and GBFEL-TIE projects to cultural resources in the Test Track impact area. A related question concerned the applicability of the GBFEL-TIE project area geomorphological taxonomy to sediments in the Test Track survey area. Thus the results of recent research in the areas to the south, together with more long-standing issues of settlement and chronology, are viewed as valid points of departure for research in the Test Track impact area and for the Holloman AFB area in general. In addition, due to the small size of the present survey (1280 acres) it is unlikely that the sample of local settlement patterns recovered is large enough to allow any but the most tenuous of conclusions. Similarly, given the limited number of artifacts recorded, extensive statistical analyses of the survey data are unwarranted.

On the other hand, the Test Track impact area represents the first large area (tens of acres or more) to be investigated in the Holloman area. Furthermore, the survey area lies near several interesting physiographic features and offers an opportunity to evaluate simple models of distributional patterning in cultural remains with respect to environmental parameters.

Analyses of the Test Track survey data focused on a number of basic questions discussed in Chapter 3. Analytical approaches to these questions are described below. The interpretation of the survey results was limited most of all by the total amount of cultural resources discovered and recorded.

Chipped and ground stone artifacts. The primary goals of the lithic analyses were to document three basic aspects of lithic assemblages: *material selection*, *tool reduction*, and *tool use* (Chapman 1977). At a minimum, the following variables were analyzed for the purposes of deriving basic information on these three assemblage characteristics: artifact type (e.g. flake, utilized debitage, blade-core, biface, point, metate), material type, condition, dorsal cortex, dimensions, and platform condition where flake counts warrant it. Variables such as wear-pattern variations which cannot be adequately monitored in the field have been specifically avoided.

Derived analytical variables included: overall assemblage size, tool and material variety, and indices of debitage assemblage content (e.g. percent cortex versus material type). Due to the low artifact counts and scattered nature of most assemblages, density estimates were not deemed appropriate. Where warranted, variability within sites (e.g. among proveniences) was also addressed.

Ceramic artifacts. Ceramic analyses were to be designed primarily to acquire chronological information using standard local typologies and associated date ranges. Bowl/jar distinctions were made where possible and appropriate in order to achieve some general index of vessel functions. Ceramic type, vessel form, and sherd counts were to be analyzed for the purposes of suggesting what ceramic functions were present at the sites and to determine if variations in abundance, age, or form are associated with environmental variables. The ceramics assemblages recorded at the Test Track impact sites are so small as to preclude all but descriptive analyses.

Fire-cracked Rock. Fire-cracked rock distributions were noted and counted during survey, and were treated as features (scattered, concentrated, associations with other evidence of fire). Fire-cracked rock is presumed to be indicative of the former presence of fire-using features, and the volume of identifiable concentrations may be indicative of functional variations in the original features. In addition, the degree of scatter present in fire-cracked rock distributions may be a clue to their current geomorphic context. This possibility was examined in the field, and the nature of fire-cracked rock distributions encountered were compared with the results of augering.

Historic period cultural remains. The remarkable diversity and greater overall "identifiability" of historic artifacts has led to the use of an extensive variety of complex techniques for analysis. Because such an approach was not feasible on the survey, historic artifacts were descriptively analyzed. Minimum information recorded included: material(s), a functional or descriptive identification (e.g. bottle, grommet, strap, can, tobacco can), special characteristics if any (e.g. purple glass, soldered can), and estimated date(s). With the exception of one isolated manifestation, no collections were made. This approach was aided by the presence of an historic artifact specialist on the survey crew. The analyst also recorded general date estimates for the recorded assemblages, and was responsible for determining when historic materials warranted recording as pre-1950.

Laboratory treatment of historical data focused on evaluating the relevance of the historical data to understanding pre-1950 use of the area. Only limited evidence of pre-1900 use of the area was encountered. No evidence of earlier Hispanic or Apachean occupations was encountered on the survey.

Chapter 5

Survey Results

Introduction

This chapter contains descriptive data and analytical summaries for the prehistoric and pre-1950 historic cultural remains documented on the Test Track Survey. The information presented is intended to serve as the basic data required for evaluating the research potential of the cultural resources located in the Test Track impact area. Narrative descriptions, maps, representative photographs, artifact summaries, and discussions of site characteristics and condition are provided for each site. Due to the small assemblages present at the prehistoric sites and doubts concerning the representativeness of the surface remains no attempts are made at functional interpretation. Chronological assignments are tenuously based on the presence of diagnostic ceramics and/or projectile points. Isolated manifestations are listed by general type. Prehistoric sites and isolates are discussed as a group, followed by historic remains. The results of the survey and their research potential are summarized and compared with data from the Border Star 85 and GBFEL-TIE project areas in Chapter 6.

A total of eight prehistoric sites and two pre-1950 historic sites were recorded in the course of the survey. In addition, 55 isolated manifestations and 25 prairie-dog towns were documented. Nine of the ten sites are located within the survey area, while one lies just outside and was discovered during the process of boundary location. The latter site's proximity to the survey area and the presence of several well-preserved hearths and large ceramic sherds, led to the site's brief recording, and inclusion in the survey data base.

All of the prehistoric sites are relatively small--rarely exceeding 100 m (330 ft.) in maximum dimensions--and contain low densities of artifacts (chipped stone and occasional ceramics, fire-cracked rock), and definite or possible fossilized gypsum hearth casts. A total of 146 lithic artifacts and 13 ceramics were recorded at the prehistoric sites, along with estimates of fire-cracked rock densities ranging from less than 10 to a few hundred. All evidence at least some wind erosion. The sites' estimated chronological affiliations fall into three classes:

(1) *Lithic Unknown* (lacking diagnostic lithics or ceramics): LA 67585, LA 67587, and LA 67588

(2) *Late Archaic* (large corner-notched points): LA 67589 and LA 67591

(3) *Formative* (ceramics, probably late Formative): LA 67592, LA 67593, and LA 67594

The two documented historic sites are isolated trash dumps which appear to date to the earliest military use of the White Sands area in the 1940s. A total of 106 historic artifact records were specifically documented at these sites (as well as a few at several of the prehistoric sites). Both also contained numerous items too common to count (e.g. glass fragments, cinders). Both historic sites may be related to the use of the Guilez Springs area just northeast of the impact area to house refugee German scientists following the Second World War.

No positively identified PaleoIndian, Apachean, or Anglo/Early Hispanic sites were encountered. It must be acknowledged, however, that any of the numerous lithic unknown conponents documented during the survey could, in fact, represent prehistoric or historic Apache occupations.

The isolated manifestations documented on the survey included 14 lithic artifacts, 22 fire-cracked rock and/or fossil hearth features, and 23 historic artifact occurrences. In addition, 25 apparently active prairie dog towns were recorded and their locations noted as clues to potential black-footed ferret habitat in the project area.

Prehistoric Sites

Each of the site descriptions which follows is accompanied by artifact tables, inked sketch maps, and , usually, representative photographs. Lithic artifact data for the prehistoric sites include artifact types, materials and cortex by site. A complete inventory of recorded lithics (by site and provenience) appears in Appendix 1. Debitage attribute data (debitage and material types, cortex, platform condition, and dimension statistics) are summarized by site and provenience in Appendix 2. Detailed artifact type and debitage data are also provided in the Data Compendium delivered to the Albuquerque CE. Historic artifact data are inventoried in the historic site descriptions.

Additional site photographs can be found in the Photographic Notebook delivered to the Albuquerque CE.

LA 67585 (OCA:366-1)

Site Type, Location and Setting. LA 67585 (Figure 5.1, Plate 5.1) is a Lithic Unknown site located on an eroded dune remnant in the sandy upland flats zone. Local vegetation consists of grass, saltbush, yucca, mesquite, and *Ephedra*. The vegetative diversity is clearly higher than on the surrounding flats, which are typical lichen-stabilized gypsum soils. The site appears to sit on a remnant of a deeper dune which has been severely eroded, with the possible exception of the northeast corner of Provenience 2. The small average size of the fire-cracked rock assemblage may reflect fragmentation due to erosion, exposure, and subsequent weathering.

The site surface is deflated and contains mesquite coppice dunes and low mounds of a compact white sand which are probably remnants of the older dune. Maximum relief is 2 m. Based on augering, the stratigraphy consists of a light beige sand (a Q4 equivalent?) overlying the white sand (Pleistocene Q1?). The sequence also includes a level of coarser reddish sand (like that in present blowout bottoms) lying between these two units, possibly indicating an older blowout beneath the beige unit sediments. If this is a recent unit lying on the older (Pleistocene) Q1, the site is probably totally eroded. No ash or obvious features, were noted.

Site Dimensions. Overall: 80x60 m. Provenience 1: 50x30 m. Provenience 2: 40x20 m.
Provenience 3: 20x15 m.

Provenience Designations and Features Present. Three proveniences were recorded: Proveniences 1 and 2 define the main site area and are separated by a large mesquite coppice dune. Both proveniences are blown out areas containing scattered lithics and fire-cracked rock. It is possible that buried deposits occur in the north end of Provenience 2 but no cultural evidence was found in an auger hole located there.

Provenience 3 is located southwest of the main site area in an eroded portion of the stable flats, and may be a clue to the possible existence of buried materials in the otherwise culturally sterile flats. Provenience 3 contains a few lithics and fire-cracked rock fragments.

Artifact Assemblages. The site assemblage and distribution consists of scatters of highly fragmented fire-cracked rock and a few concentrations. These may represent fragmented individual rocks. Chipped stone is also scattered throughout the Proveniences 1 and 2. No true concentrations were noted.

Recorded artifacts consist mostly of flakes of various material types (Table 5.1). One tool was noted: a pounder of siltstone. No ground stone was found. Two historic artifacts (1920s) were also noted. All lithics (21) were flagged and recorded; 50 percent of the fire-cracked rock was flagged .

Preliminary Evaluation. The potential for buried materials at LA 67585--other than shallow, mixed subsurface materials--is very low. It is possible that some buried remains may exist in the deeper deposits at the north end of Provenience 2 and in vegetation-stabilized dune sands at the site's periphery. The site should be tested to evaluate this question.

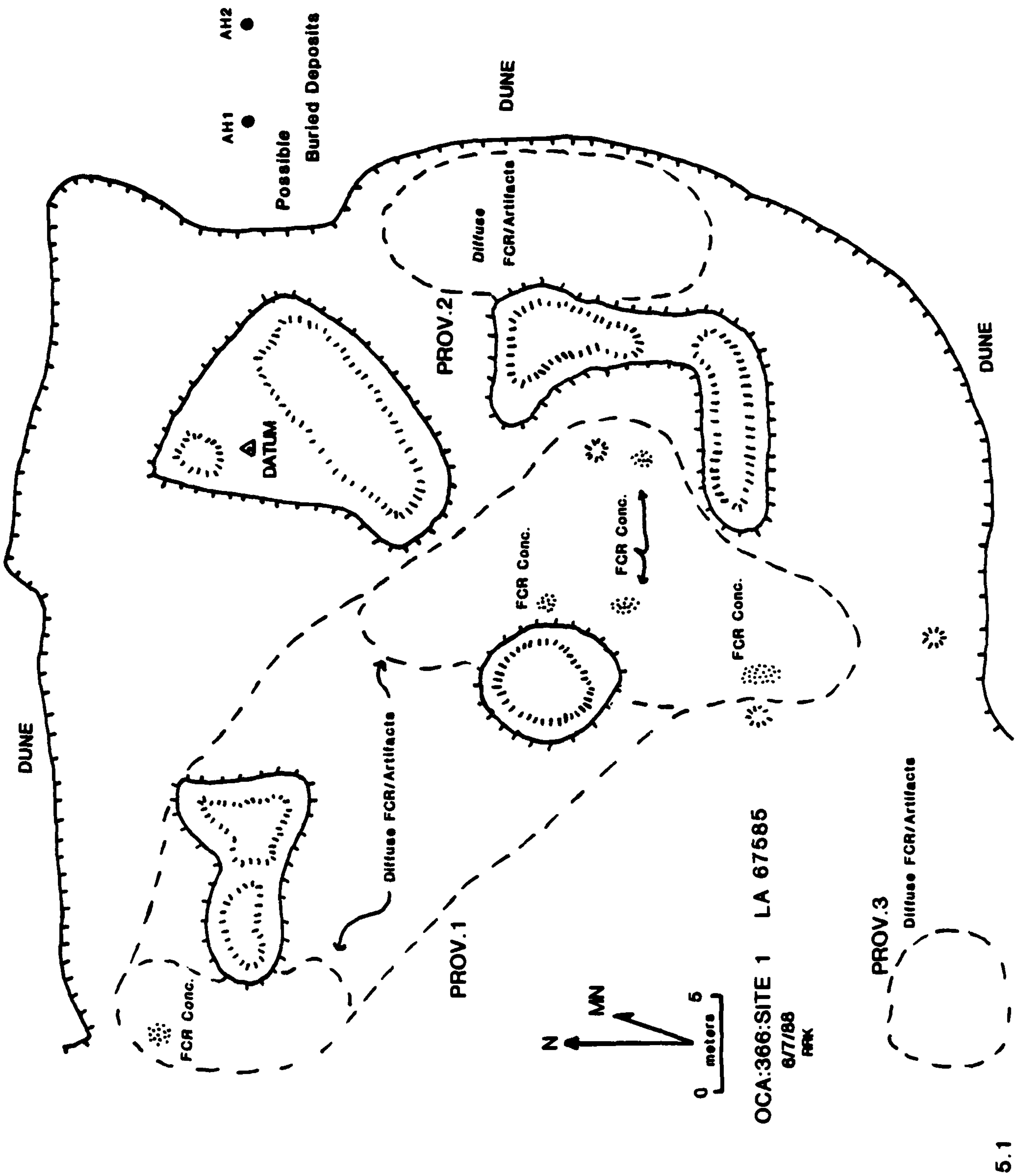

AH1
AH2
Possible
Buried Deposits
DUNE
DUNE
DUNE
Diffuse
FCR/Artifacts
PROV.2
DATUM
FCR Conc.
FCR Conc.
FCR Conc.
Diffuse FCR/Artifacts
FCR Conc.
PROV.1
OCA:366:SITE 1 LA 67585
6/7/88
RRK
N
MN
0
5
meters
PROV.3
Diffuse FCR/Artifacts

Figure 5.1

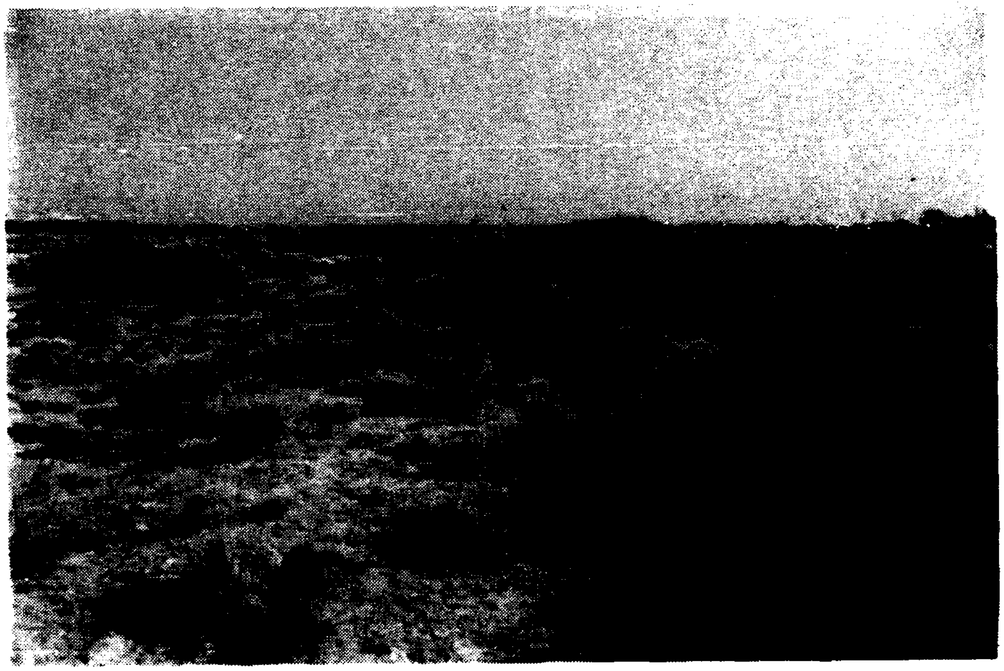


Plate 5.1. LA 67585; general site view; Provenience no. 1 on left, Provenience no. 2 on right

Table 5.1 LA 67585 (field no. 1) Artifact types, materials and cortex

Material Type / Artifact Type

Frequency Column percent	Angular debris	Flakes	Hammer-stones	Unifaces	Total
Silt/claystone	0 0.00	4 44.44	1 100.00	1 100.00	6
Misc. chert	7 70.00	3 33.33	0 0.00	0 0.00	10
Chalcedony	2 20.00	2 22.22	0 0.00	0 0.00	4
Quartzitic sandstone	1 10.00	0 0.00	0 0.00	0 0.00	1
Total	10	9	1	1	21

Percent Cortex

CORTEX	Frequency	Percent
None	14	66.7
5	1	4.8
20	1	4.8
25	1	4.8
55	2	9.5
95	1	4.8
100	1	4.8

LA 67587 (OCA:366-3)

Site Type, Location and Setting. Cultural remains at LA 67587 (Figure 5.2, Plate 5.2, cover photo) are so sparsely distributed that it was initially recorded as an isolated manifestation. Closer inspection, however, revealed a few lithics and fire-cracked rock fragments and numerous possible fossil hearths. The site is located on the windward slopes and interior floor of a large parabolic dune (see cover photo) in the parabolic dunes zone.

The site contains two proveniences: Provenience 1 lies on the floor of the dune interior at the "focus" of the parabola where lichen-stabilized eolian sands give way to the more active sands at the "point" and lower slopes of the dune. Provenience 2 is located midway up the southeastern interior dune slopes.

Vegetation at the site is typical of parabolic dune interiors. Lichen-stabilized deposits, exhibiting the saltbush, grass, mesquite, and *Ephedra* community of the uplands occur on the broader part of parabolic dune "floor". Yucca, sand sage, *Ephedra*, and giant dropseed are common but less dense on the more active sediments of the dune slopes and dune floor near the point of the parabola.

Site Dimensions. Overall: 75x50 m.
Provenience 1: 30x30 m. Provenience 2: 40x20 m.

Provenience Designations and Features. Provenience 1 consists of approximately 5 or more possible fossil qypsum hearths located in two areas. The first is near the site datum and is possibly associated with a bifacial drill of black chert. The other lies approximately 15 m to the north near the base of the northern inner dune slopes. The hearths consist of low mounds (5-10 cm high, 1-1.5 m diameter) of hardened gypsum sand which are currently eroding and have a somewhat "crumbled" appearance. No charcoal or ash was noted in the hearths, but their appearance in comparison to more definite features such as those at LA 67588 suggests they are relict features.

Two flakes and two to three fire-cracked rock fragments (limestone) were also noted in the Provenience 1 area.

The depth of the Provenience 1 deposits is difficult to assess but could be up to 20 cm. Provenience 1 is of unknown age (Lithic Unknown) and has an ephemeral historic component consisting of a few bullets and shells (1940s in age) found scattered on the upper dune slopes .

Provenience 2 lies on a sloping but distinct "terrace" along the middle interior slopes of the southeast and south part of the dune, and contains numerous pedestaled (to 30 cm) possible fossil gypsum hearths or hearth remnants (Plate 5.2). No fire-cracked rock or artifacts were noted in association, but the pedestals are similar to more definite fossil hearth features at LA 67588.

One possible explanation for the terrace is that repeated hearth use along the upper slopes of the prehistoric dune created a broad expanse of hardened qypsum which has since resisted erosion, thus creating a shelf or terrace, remnants of which are preserved today. The terrace is clearly visible on the right side of the cover photo (view is to the northeast). A small pedestal was collected for evaluation in the laboratory. If the hearths are real, it is possible that the occupation horizon extends into the dune deposits up slope as much as 50 cm or more.

Artifact Assemblages. The site's artifact assemblage (Table 5.2) is extremely limited and consists of the following: Provenience 1 has two flakes and two to three fire-cracked rock fragments, as well as historic bullets and casings. Provenience 2 contains no artifacts.

Preliminary Evaluation. In general, the site is probably quite eroded, shallow, and, given the paucity of artifacts, quite ephemeral. The numerous possible fossil hearths, however, if real, suggest substantial occupation. Shovel scraping and screening should be conducted in both proveniences and some attempt should be made to confirm or deny reality of fossil hearths. If real, testing is warranted in both proveniences. Provenience 2 may contain an occupation horizon in the up slope dune deposits.

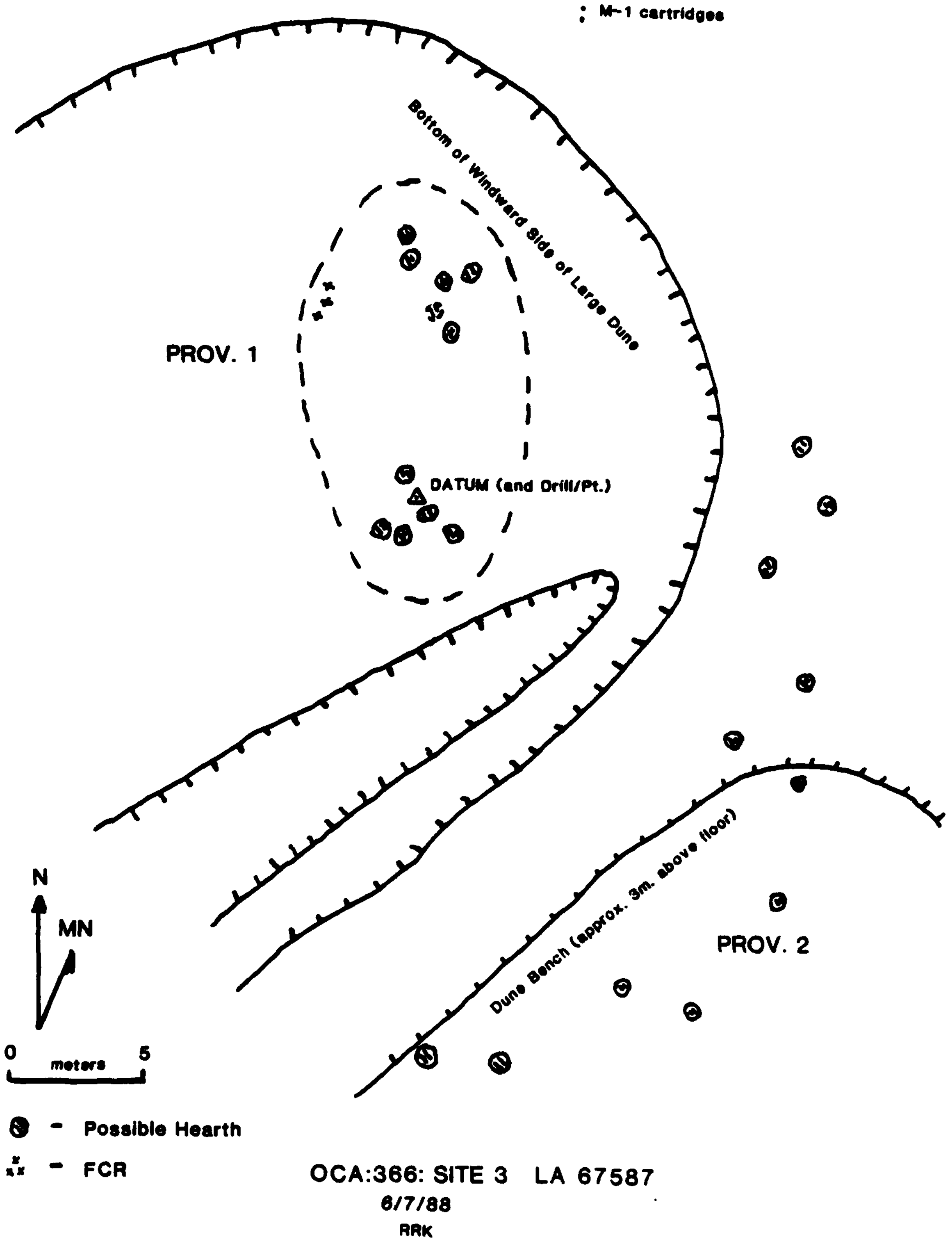

M-1 cartridges
Bottom of Windward Side of Large Dune
PROV. 1
DATUM (and Drill/Pt.)
PROV. 2
Dune Bench (approx. 3m. above floor)
N
MN
0
meters
5
- Possible Hearth
- FCR
OCA:366: SITE 3 LA 67587
6/7/88
RRK

Figure 5.2

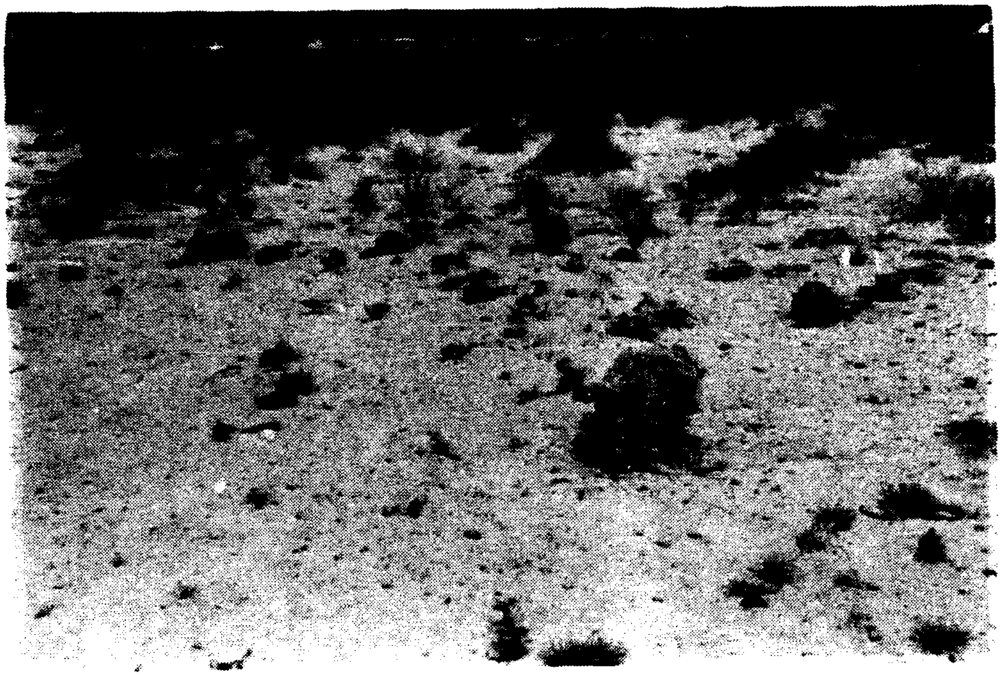


Plate 5.2. LA 67587; Possible pedestaled fossil hearths on inner dune face "terrace" (Provenience no. 2)

Table 5.2 LA 67587 (field no. 3) Artifact types, materials and cortex

Material Type / Artifact Type

Frequency Column percent	Flakes	Drills	Total
Fossil chert	0 0.00	1 100.00	1
Chalcedony	2 100.00	0 0.00	2
Total	2	1	3

Percent Cortex

CORTEX	Frequency	Percent
N/A	3	100.0

LA 67588 (OCA:366-4)

Site Type, Location and Setting. LA 67588 (Figure 5.3, Plates 5.3, 5.4) is a Lithic unknown and historic site similar to and located southwest of LA 67587 on the interior slopes and floor of a similar large parabolic dune (dunes environmental zone). Vegetation is like that at LA 67587 and typical of parabolic dunes. It has two components. The broader part of the dune floor consists of lichen-stabilized eolian sands with the saltbush, grass, *Ephedra*, and mesquite community of the sandy upland flats. The dune slopes and floor near the point of the parabola are more active, and exhibit less vegetation, with *Ephedra*, sand sage, giant dropseed, and yucca dominating.

Site Dimensions. Overall: 100x100 m.
Provenience 1: 40x25m. Provenience 2: 100x50 m.

Provenience Designations and Features Present. In the field, the site was recorded as one provenience (including lithics) but was divided into two proveniences in the laboratory. The site has Lithic Unknown and historic components. The latter is based on two 44-caliber Henry (rimfire) cartridges found on the upper eastern slope of Provenience 2 and dating to mid-late 1800s. These artifacts may represent late 19th century use of the area by either Anglo/Hispanic or, possibly, historic period Mescalero Apaches (Chapter 3).

Provenience 1 is located on the dune floor where lichen-stabilized soils give way to more active deposits and consist of scattered fire-cracked rock and lithics in two locations. No fossil hearths were noted. Depth is probably less than 20 cm, but the possibility of buried materials in the more stable deposits to the west should be considered.

Provenience 2 is located along middle and upper interior slopes (east, southeast and south) of the dune on a sloping terrace similar to that at LA 67587 (Plate 5.4). Two definite (Features 1 and 2) and numerous possible fossil hearth remnants are scattered along the terrace, and are concentrated in the eastern and southern areas. Lithics and fire-cracked rock appear to be associated with several of the hearths, especially in the south area. The total number of flagged hearths was 16. The hearths are generally more common and higher in elevation on the southern slopes, and include Features 1 and 2.

Feature 1 (Plate 5.3) is an eroding, pedestaled fossil hearth remnant at the top of the slope, and is approximately 50 cm across x 20 cm thick. The hearth remnant contains charcoal and ash in some abundance. Feature 1 was sampled for the purposes of evaluating the potential of burned gypsum to yield archeomagnetic dates. Feature 1 is eroding rapidly (one piece has broken away) and is in danger of eventual destruction by the elements. Feature 1 is dateable (radiocarbon) and probably contains valuable archeobotanical materials. It is surrounded by several other fossil hearth remnants.

Feature 2 is a large mound of hardened gypsum approximately 5 m across situated on the eastern dune slope at the "nose" of the dune interior. The feature contains no obvious charcoal or ash, and no fire-cracked rock or artifacts were found in association. Nonetheless, it is believed that the feature is probably a fossil hearth.

Other possible fossil hearths are scattered along the Provenience 2 "terrace", but are smaller and generally lack fire-cracked rock. As with LA 67587, it is possible that the "terrace" represents numerous hearth-using events, the product of which is an erosion-resistant level which approximates the prehistoric dune surface. This possibility, together with the implications for a level of buried cultural remains extending into the dune, deserves consideration.

Augering near Features 1 (Hole #2) and 2 (Hole # 1) yielded no cultural stains or other evidence of buried remains. Hole #3, also near a hearth, was "dry", too. Still, buried remains in Provenience 2 are a distinct possibility, given the presence of at least one very definite hearth (Feature 1). Augering on the dune floor in Provenience 1 also yielded nothing, even in the semi-stable deposits (low mound) west of Provenience 1. Hole #4 (samples taken) and Hole #5 yielded the possible beginnings of a Holocene stratigraphic sequence, but its interpretation awaits a more detailed study of the local geomorphology. (Note: The "floor" areas of the parabolic dunes may be where strata are the thinnest and hence constitute good targets for such investigations). The four strata noted in Hole #4 are as follows:

(1) white gypsum sand (loose, probably modern);
(2) a slightly redder sand at approximately 40 cm depth;
(3) a distinctly redder sand at 50 cm; and
(4) a hard white level (possibly caliche) at 60 cm.

In hole #5 a layer of crystalline gypsum was found between the third and fourth strata.

Artifact Assemblages. The site assemblage (Table 5.3) includes the following artifacts: Provenience 1 has fire-cracked rock (less than 10 pieces) and lithics (including a spokeshave) scattered in two locations. No fossil hearths were noted. Provenience 2 has numerous (two definite) fossil hearth remnants. Lithics and fire-cracked rock

appear clearly associated with several hearths.

The 13 lithics recorded include mostly angular debris in addition to a spokeshave and a limestone core. No ground stone was noted. The fire-cracked rock present is mostly limestone but one or two volcanics were also noted.

The site's historic component consists of the two 44-caliber Henry cartridges described above.

Preliminary Evaluation. As in the case of LA 67587, the site contains few artifacts but is high in fossil hearths. Buried remains (shallow in Provenience 1, deeper in Provenience 2) are possible but need further evaluation. LA 67588 is the best example of the large parabolic dune setting which is probably common in the Test Track area. The site's significance and research potential lie in this fact and in the presence of dateable hearths and the possibility of evaluating the fossil hearth "terrace" hypothesis.

The few historic artifacts present appear to reflect either Anglo/Hispanic or Apache activities, but cannot be associated with other site features.

Table 5.3 LA 67588 (field no. 4) Artifact types, materials and cortex

Material Type / Artifact Type

Frequency Col Pct	Angular debris	Flakes	Tested rocks	Irregular cores	Spokeshaves	Total
Misc. chert	2 33.33	1 33.33	1 50.00	0 0.00	0 0.00	4
Chalcedony	0 0.00	0 0.00	0 0.00	0 0.00	1 100.00	1
Quartzite	4 66.67	0 0.00	0 0.00	0 0.00	0 0.00	4
Limestone/ carbonate	0 0.00	2 66.67	1 50.00	1 100.00	0 0.00	4
Total	6	3	2	1	1	13

Percent Cortex

CORTEX	Frequency	Percent
None	9	69.2
5	1	7.7
20	1	7.7
80	1	7.7
97	1	7.7

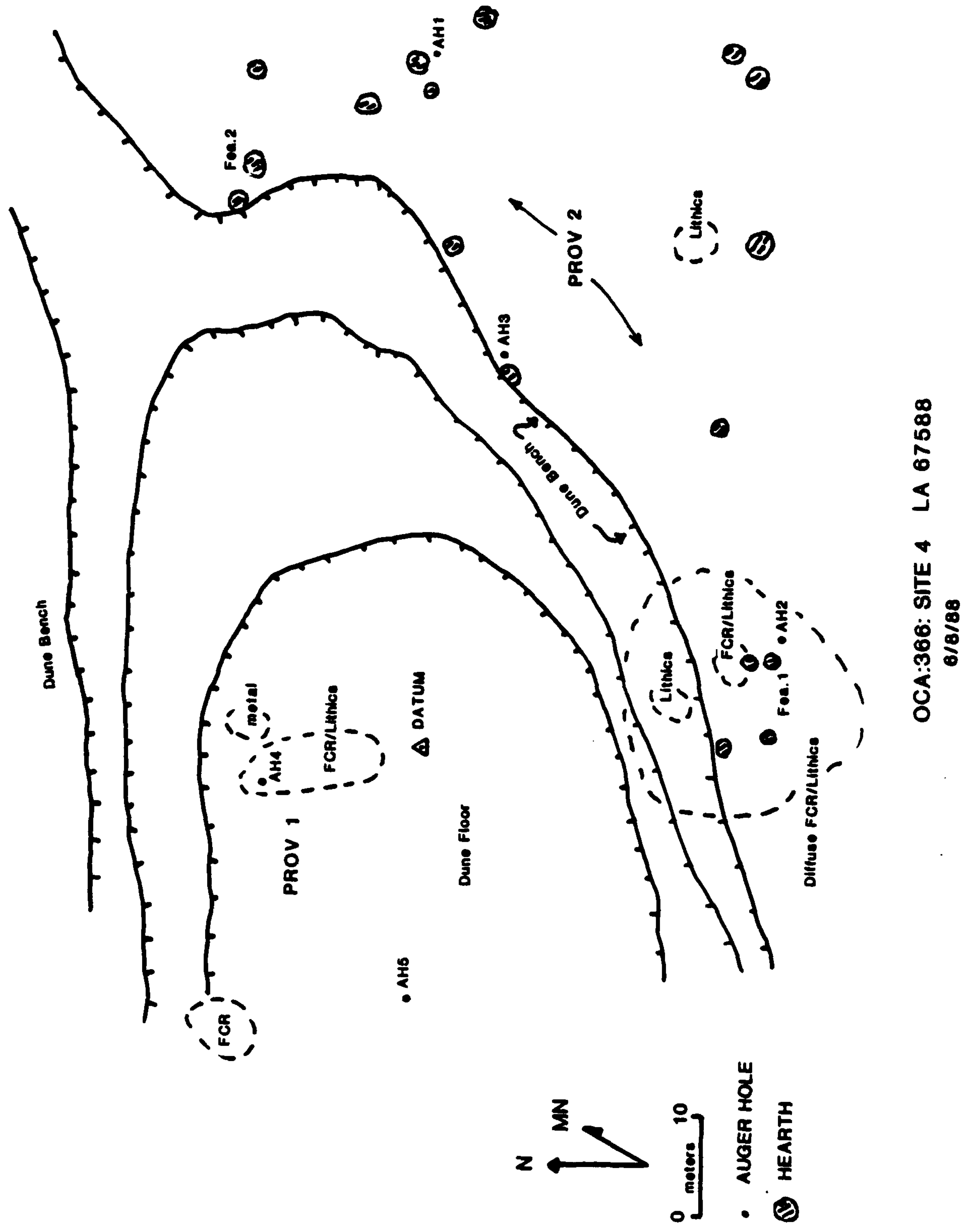

OCA:366: SITE 4 LA 67588
6/8/88
RRK
Fea.2
AH1
PROV 2
Lithics
AH3
Dune Bench
FCR/Lithics
AH2
Lithics
Fea.1
Diffuse FCR/Lithics
metal
FCR/Lithics
AH4
DATUM
Dune Floor
PROV 1
Dune Bench
AH5
FCR
N
MN
0 meters 10
AUGER HOLE
HEARTH

Figure 5.3

Plate 5.3. LA 67588; Feature 1 fossil hearth (compass to north)

Plate 5.4. LA 67588; View of east and south interior parabolic dune slopes

LA 67589 (OCA:366-5)

Site Type, Location and Setting. LA 67589 (Figure 5.4, Plate 5.5) is a site of probable Late Archaic origin with two distinct proveniences located in an outlying semi-stable dune remnant. The dune is more or less parabolic in form but is generally better-stabilized than the more classic ones elsewhere in the survey area. The LA 67589 dune is part of a series of poorly-formed dunes in the parabolic dune zone. The vegetation is typical of semi-stable dune areas, with a saltbush, grass, *Ephedra*, and mesquite community in the lichen-stabilized dune deposits and *Ephedra*, giant dropseed, sand sage, and yucca occurring in the more active deposits. The two proveniences are separated by ca. 80 m and are characterized by different surface conditions and geomorphic contexts.

Provenience 1 lies in the southeast part of the site in the more active deposits of the dune crest and an associated near-parabolic depression. Provenience 2 lies to the northwest on a low dune ridge with lichen-stabilized dune deposits exhibiting some areas of erosion. The dune crest overlooks the sandy upland flats to the east. The topography to the west consists of low, rolling dunes, mostly lichen-stabilized.

Site Dimensions. Overall: 150x130 m.
Provenience 1: 45x40 m. Provenience 2: 60x25 m.

Provenience Designations and Features Present. Provenience 1 occupies a blowout depression surrounded on the east, southeast, and south by semi-active dune crest deposits, rolling stable deposits to the west and the Provenience 2 dune ridge to the north. The depression consists of several small blowouts separated by small coppice dunes. Fire-cracked rock occurs as a general scatter and in five to six concentrations. Five to six possible or definite fossil hearths occur on the slopes above the depression, and include Feature 3 which contains definite charcoal and ash. Two ash stains (Features 1 and 2) are also present on the south slope.

The large, corner-notched projectile point found in Provenience 1 appears to be Late Archaic in age.

Feature 1 consists of buried ashy gypsum, some small fire-cracked rock, and one to two concentrations of lithics. The feature is not intact but is partially preserved including some buried ash and charcoal. Feature 1 is 5 m east/west by 3 m, and lies on the lower slope just above a blowout.

Feature 2 is near the top of the dune on the south side of the depression and consists of an ash stain which is largely exposed and nearly gone. Some lithics and fire-cracked rock were noted in the vicinity.

Feature 3 lies between Features 1 and 2 on slope and is an ash stained hearth with lithics and fire-cracked rock nearby. Lithics and fire-cracked rock are also scattered across the slope as well as in the depression blowouts. Auger Hole #3 in the coppice dune north of Feature 1 yielded no cultural evidence but buried deposits nonetheless seem likely to 50 cm or more, especially in the south slope deposits which appear less eroded.

In addition to Features 1, 2, and 3, Provenience 1 also contains several possible fossil hearths. Auger Holes #1-4 yielded no cultural materials or stains. Fire-cracked rock and possible fossil hearths appear to extend to the north of Provenience 2 (outside the survey area).

Provenience 2 sits on a lichen-stabilized dune ridge approximately 80 m northwest of Provenience 1. Some areas appear eroded but most of the provenience exhibits a fairly stable surface. The provenience consists of three definite hearth features, one large probable fossil hearth, and an extensive scatter of numerous (20-40) possible fossil hearths along with an extensive scatter of lithics (12) and fire-cracked rock (150-200). Vegetation includes saltbush, grass, mesquite and some *Ephedra*. Provenience 2 consists of several definite hearth features, numerous scattered possible fossil hearths, and scattered fire-cracked rock and lithics.

Buried materials are undoubtedly present but probably to depths of less than 50 cm.

Feature 4 is a small cluster (less than 50 cm across) of pedestaled small (5 cm) burned gypsum remnants. They are unusual in being quite black (they were not closely examined because of their fragile condition). No ash or fire-cracked rock was noted in association.

Feature 5 is a diffuse ash stain (1.5 m across) with some associated fire-cracked rock to the north.

Feature 6 is a 1-2 m diffuse ash stain with scattered fire-cracked rock in association.

Feature 7 is a large eroding mound (3x6 m) of hardened gypsum, much of it pedestaled, surrounded by a fire-cracked rock scatter. One piece of fire-cracked rock is also pedestaled on the mound and the feature is probably a large fossil hearth remnant.

The crest of the dune ridge to the northwest, north, and northeast of Feature 7 contains a near continuous scatter

of eroding possible fossil hearths, and the area is generally less stable than the rest of the ridge to the west and the slopes to the south. If these features in fact represent fossil hearth remnants, the area may have been extensively used (or reused) for hearth activities.

The point and biface found at Provenience 2 suggest a tentative Late Archaic affiliation.

Artifact Assemblages. The provenience 1 lithic assemblage (Table 5.4) exhibits considerable diversity in types and materials, and includes flakes, angular debris, a scraper, and a single-notch (probably unfinished) projectile point. The scraper has both convex and concave retouched edges. Fire-cracked rock material types include limestone, quartzite, arkosic sandstone, silicified sandstone, and miscellaneous volcanics (diorite?). Other tools present are one or more pounder-hammerstones, pecking stones (sharp, battered edges), and cores. Total fire-cracked rock count is estimated at 200 or more pieces.

Provenience 2 lithics (Table 5.4) include several material types and flakes, angular debris, retouched angular debris, a well-made biface, and a crude unifacial point which appears unfinished, and which may be Late Archaic. Fire-cracked rock materials are mostly limestone.

LA 67589 also has a very minor historic component consisting of a 30-06 shell and a can fragment, ages unknown, found in Provenience 1.

Preliminary Evaluation. Both proveniences at site OCA 366-5 appear to contain several partially intact features which can yield dates and archeobotanical remains. In addition, both proveniences contain diverse lithic assemblages (material and type diversity) and the potential for buried intact features and assemblages. The diverse assemblages and numerous features (and depth) indicate significant research potential. LA 67589 contains the largest and most diverse lithic assemblage documented in the Test Track survey.

Plate 5.5. LA 67589; central Provenience no. 1 blowout area

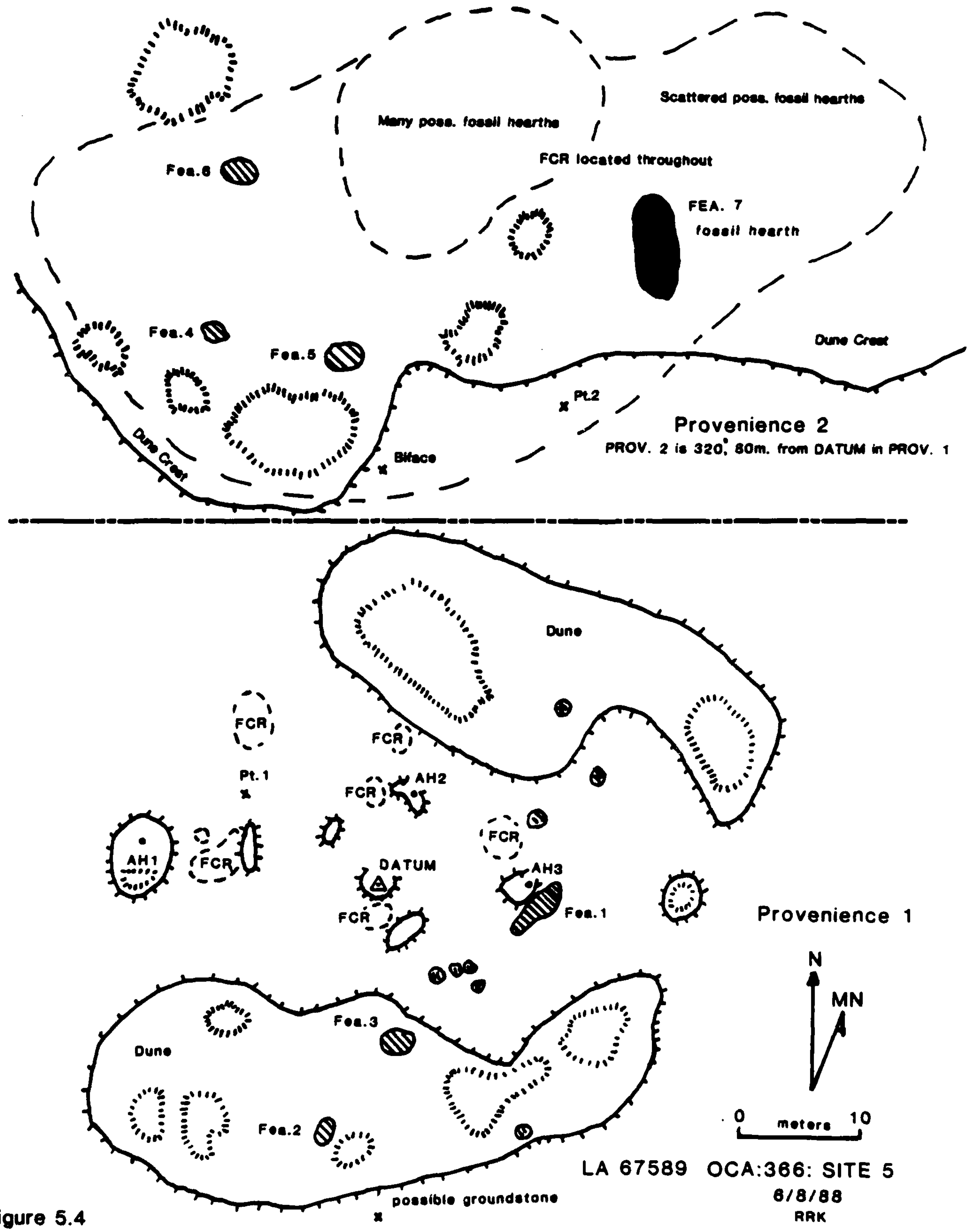

Many poss. fossil hearths
Scattered poss. fossil hearths
FCR located throughout
Fea. 6
FEA. 7
fossil hearth
Fea. 4
Fea. 5
Dune Crest
Dune Crest
Pt. 2
Biface
Provenience 2
PROV. 2 is 320°, 80m. from DATUM in PROV. 1
Dune
FCR
FCR
Pt. 1
FCR
AH2
FCR
AH1
FCR
DATUM
AH3
FCR
Fea. 1
Provenience 1
N
MN
Dune
Fea. 3
Fea. 2
0 meters 10
possible groundstone
LA 67589 OCA:366: SITE 5
6/8/88
RRK

Figure 5.4

Table 5.4 LA 67589 (field no. 5) Artifact types, materials and cortex

Material Type Frequency Column percent	Artifact Type Angular debris	Flakes	Irre-gular cores	Hammer-stones	Pecking stones	Ret'd. angular debris	Total
Altered sedimentary	2 15.38	3 12.00	2 50.00	0 0.00	0 0.00	0 0.00	8
Pedernal chert	0 0.00	1 4.00	0 0.00	0 0.00	0 0.00	0 0.00	2
Jasper	0 0.00	0 0.00	0 0.00	0 0.00	1 100.00	0 0.00	1
Misc. chert	5 38.46	15 60.00	0 0.00	0 0.00	0 0.00	1 100.00	25
Chalcedony	1 7.69	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	1
Quartzite	1 7.69	1 4.00	0 0.00	0 0.00	0 0.00	0 0.00	2
Quartzitic sandstone	1 7.69	1 4.00	1 25.00	1 50.00	0 0.00	0 0.00	5
Limestone/ carbonate	1 7.69	3 12.00	1 25.00	1 50.00	0 0.00	0 0.00	6
Feldspar	2 15.38	1 4.00	0 0.00	0 0.00	0 0.00	0 0.00	3
Total	13	25	4	2	1	1	53

(Continued)

Table 5.4 continued. LA 67589 (field no. 5) Artifact types, materials and cortex

Material Type / Frequency / Column percent	Artifact Type: Re-touched flakes	Pro-jectile points	Bifaces	Unifaces	Spoke-shaves	Unknown ground stone	Total
Altered sedimentary	0 0.00	0 0.00	1 100.00	0 0.00	0 0.00	0 0.00	8
Pedernal chert	0 0.00	1 50.00	0 0.00	0 0.00	0 0.00	0 0.00	2
Jasper	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	1
Misc. chert	1 100.00	1 50.00	0 0.00	1 100.00	1 100.00	0 0.00	25
Chalcedony	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	1
Quartzite	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	2
Quartzitic sandstone	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	1 100.00	5
Limestone/ carbonate	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	6
Feldspar	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	3
Total	1	2	1	1	1	1	53

Percent Cortex

CORTEX	Frequency	Percent
N/A	17	32.1
None	28	52.8
2	1	1.9
5	1	1.9
17	1	1.9
19	1	1.9
20	1	1.9
25	1	1.9
60	1	1.9
70	1	1.9

LA 67591 (OCA:366-7)

Site Type, Location and Setting. LA 67591 (Figure 5.5, Plate 5.6) consists of three proveniences of Late Archaic and/or Lithic Unknown affiliation. The site is located on a low, isolated semi-stable dune remnant in the sandy upland flats environmental zone. The site provides good views of the uplands, the dunes to the west, and the drainage (Allen Draw) to the south. A possible playa or ephemeral pond (Plate 2.3) is located just southwest of the site, and may have played a role in its prehistoric occupation.

The eastern portion of the site consists of a blowout area where artifacts and features are exposed (Provenience 1), and is bounded on the east by a low, semi-active dune crest. Vegetation is typical semi-stable dune complex (*Ephedra*, sand sage, giant dropseed, mesquite, yucca). Provenience 2 is located west/southwest of Provenience 1 where the topography becomes flatter and the eolian sands are more lichen-stabilized. Provenience 2 vegetation conforms to the sandy uplands complex (saltbush, grass, and mesquite).

Site Dimensions. Overall: 110x90m.
Provenience 1: 45x30m. Provenience 2: 95x75m.
Provenience 3:10x10 m.

Provenience Designations and Features Present. Provenience 1 is largely blown out and contains two features along with scattered fire-cracked rock (approximately 25) and lithics (5). Feature 1 consists of two adjacent ash stains on the north side of the blowout (approximately 1 m apart), each of which is about 50 cm across. The ash probably extends below the surface and horizontally, but the area is too delicate to test without proper excavation methods.

Feature 2 is a 4 m diameter pedestaled fossil hearth with associated ash stains. No stains were found in the auger hole placed in the coppice dune located just east of Feature 2, however. Shallow buried deposits are probable below the blowout surface; buried remains may also occur in the deeper sands around the blowout.

Provenience 2 is distinguished from Provenience 1 only on the basis of a difference in surface conditions. Provenience 2 is flatter and the deposits more stable. Interestingly, artifacts (22 lithics, approximately 150 fire-cracked rock) are abundant as a scatter, but features (except fire-cracked rock) are absent, possibly due to the difference in geomorphic contexts. Any features in Provenience 2 may be buried or, alternatively, have eroded entirely. Provenience 2 should be tested to evaluate these possibilities. The depth of cultural deposits in Provenience 2 is unknown. Auger Hole #2, was placed near a scatter of fire-cracked rock, but yielded no cultural stains or artifacts. If buried features exist, however, cultural remains may occur as deep as 30-50 cm.

An interesting but unconfirmed possibility is that Proveniences 1 and 2 are functionally different. The possible playa located just to the southwest of the site lies on a line with Proveniences 1 and 2, and it is possible that local topographic features could have structured the activities conducted at the site.

The Projectile point found in Provenience 2 is probably Late Archaic in age.

Provenience 3 was discovered after site recording was completed, and the two lithics present were not recorded. Both were debitage. A few fire-cracked rock fragments are also present on a very small stabilized dune remnant to the southwest of Provenience 2, and lie east/southeast of the playa. No features were noted, and the deposits at Provenience 3 were not augered.

Artifact Assemblages. Provenience 1 lithics consist of four flakes and one piece of angular debris (Table 5.5). Fire-cracked rock materials were not specifically noted but consisted mostly of limestone.

The Provenience 2 lithic assemblage (22 total) is fairly diverse and includes unifaces, one biface, one Late Archaic projectile point, and one core. Fire-cracked rock is abundant (150 pieces estimated); materials consist almost entirely of limestone.

Preliminary Evaluation. Based on the presence of a distinctive Archaic projectile at LA 67591, the site is assigned to the Late Archaic period. The possibility of multiple occupations should not be discounted, however.

LA 67591 has probable subsurface materials in addition to datable features with archeobotanical materials. The site's location away from the main dune complex and near Allen Draw and a possible playa give it particular significance. The site's lithic assemblage also exhibits fair to high diversity also.

LA 67591 is only moderately eroded, but the site is littered with Test Track debris including metal pieces and fragments of rocket fuel. The site lies approximately 700 m north of the end of the Test Track only a few degrees off of the track orientation. It is also located approximately 200 m from the impact dune-rocket motor disposal area on the north side of Allen Draw. As such, the site is

subject to considerable potential impacts (literally) from Test Track activities. No obvious large debris impacts were noted, and smaller ones are generally less than 10 cm deep and 20-30 cm across. Nonetheless, the large rocket motor parts noted in the south part of the impact area and in the vicinity of the site indicate that the potential impacts are great.

The site may require data recovery activities as there is no viable avoidance option and no way to shield it. Provenienccs 1 and 2 should be tested for depth, stripped, and screened; features should be excavated.

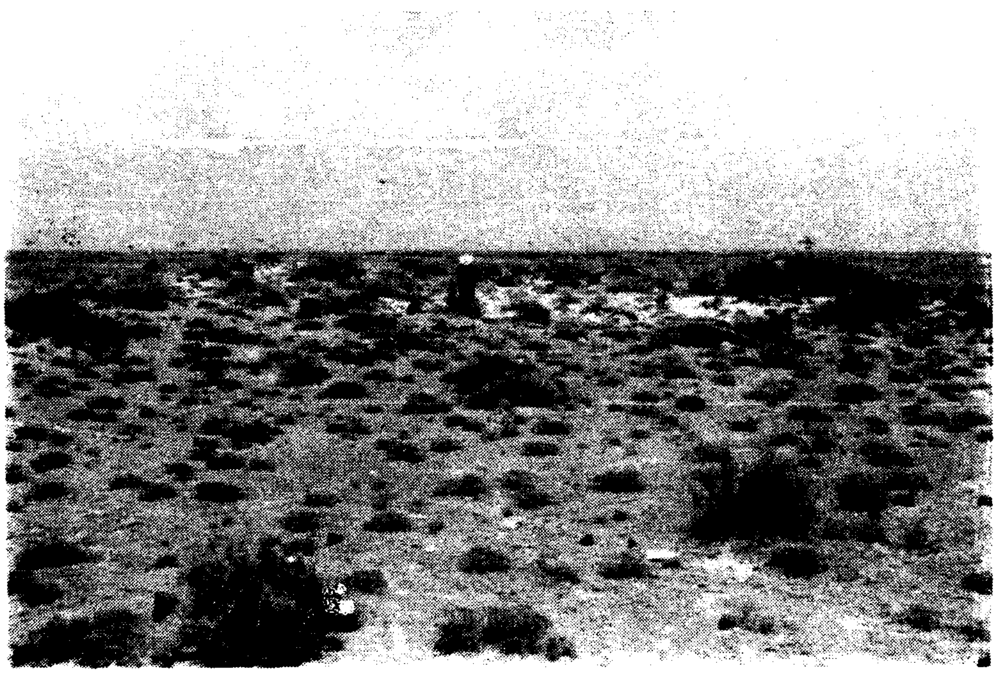
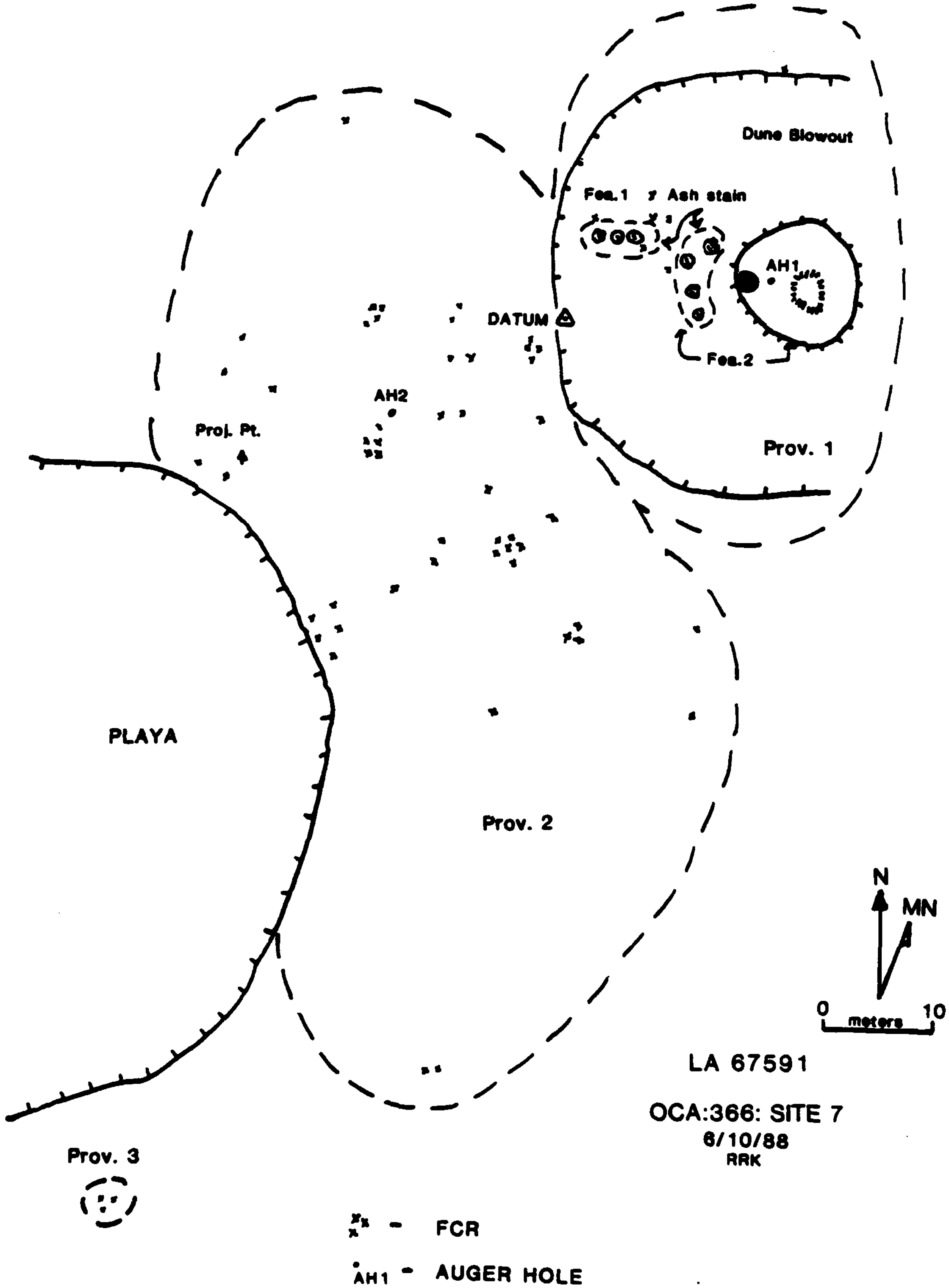


Plate 5.6. LA 67591; view northeast across Provenience no. 2 to Provenience no. 1



Dune Blowout
Fea. 1
Ash stain
AH1
DATUM
Fea. 2
AH2
Proj. Pt.
Prov. 1
PLAYA
Prov. 2
N
MN
0
meters
10
LA 67591
OCA:366: SITE 7
6/10/88
RRK
Prov. 3
FCR
AH1
AUGER HOLE

Figure 5.5

Table 5.5 LA 67591 (field no. 7) Artifact types, materials and cortex

Material Type Frequency Column percent	Angular debris	Flakes	Irregular cores	Projectile points	Bifaces	Unifaces	Total
Altered sedimentary	0 0.00	2 15.38	0 0.00	0 0.00	0 0.00	0 0.00	2
Fossil chert	0 0.00	2 15.38	0 0.00	0 0.00	1 100.00	0 0.00	3
Pedernal chert	0 0.00	1 7.69	0 0.00	0 0.00	0 0.00	0 0.00	1
Misc. chert	2 50.00	4 30.77	1 100.00	1 100.00	0 0.00	3 75.00	11
Chalcedony	0 0.00	3 23.08	0 0.00	0 0.00	0 0.00	0 0.00	3
Quartzite	2 50.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	2
Limestone/ /carbonate	0 0.00	1 7.69	0 0.00	0 0.00	0 0.00	1 25.00	2
Total	4	13	1	1	1	4	24

Percent Cortex

CORTEX	Frequency	Percent
None	19	79.2
5	1	4.2
20	3	12.5
100	1	4.2

LA 67592 (OCA:366-8)

Site Type, Location and Setting. LA 67592 (Figure 5.6, Plate 5.7) is a Late Formative (Provenience 1) and Lithic Unknown (Provenience 2) site located on the windward (western) slopes of a poorly defined parabolic dune. The site is bounded on the south by a low dune ridge which merges into the larger structure to the east, forming a smaller parabola. Deposits in the area are generally better stabilized by vegetation than in the more well-defined parabolic dunes.The upper slopes of the dune (especially Provenience 1) are sandy, though, and exhibit the *Ephedra*, sand sage, and grass vegetation typical of semi-stable dunes. The floor of the dune interior and even the lower dune slopes are lichen-stabilized with typical upland flats vegetation (saltbush, grass, mesquite, and *Ephedra*). The site contains lithics, three ceramics, fire-cracked rock, two distinct features and several possible fossil hearths. The fossil hearths are limited to the middle and upper slopes of the dune where wind erosion is greatest.

Site Dimensions. Overall: 80x80 m.
Provenience 1: 50x20 m. Provenience 2: 50x25 m.

Provenience Designations and Features Present. Provenience 1 is located on the middle and upper slopes of the dune nose where the deposits are less vegetated and more exposed. Provenience 1 consists of approximately five to six fossil hearths (two definite ashy hearths: Features 1 and 2), 18 lithics, three sherds, and abundant (120-150) fire-cracked rock. Fire-cracked rock occurs both as scatters and concentrations near fossil hearths.

Feature 1 lies on a level area near the top of the slope and consists of a 4x4 m hearth area with a well-burned piece of hardened gypsum (approximately 35 cm) in the center. This burned gypsum appears to be the inverted "cast" of the hearth bottom. Some scattered fire-cracked rock was noted nearby. Feature 1 is probably collapsed but still contains charcoal and ash. The site's three ceramics were found in the same area of the upper slopes; one sherd of Chupadero Black-on-white was found near Feature 1.

Feature 2 is a thick (20 cm), broad (2 m) slightly sloping fossil hearth with abundant charcoal and ash which outcrops on the middle dune slope below Feature 1. It may be partially collapsed. Fire-cracked rock, lithics, and one to two other possible fossil hearths occur in the same area.

An auger hole placed near Feature 1 yielded no stain but shallow cultural remains in Feature 1 area seem probable. In order to avoid unnecessary disturbance, no augering was conducted in the slope deposits above Feature 2, but buried materials and a continuation of Feature 2 are highly probable (depth to 50 cm or more).

Provenience 2 is located southwest of Provenience 1 on the mid and lower slopes of the dune interior just above the floor and consists of one to two probable fossil hearths with some fire-cracked rock in association. Also present are four lithics, and approximately 50 fire-cracked rocks including a scatter and three distinct concentrations.

No augering was performed in Provenience 2 but most of surface is lichen-stabilized and thus buried intact remains are probably present, perhaps to 50 cm or so.

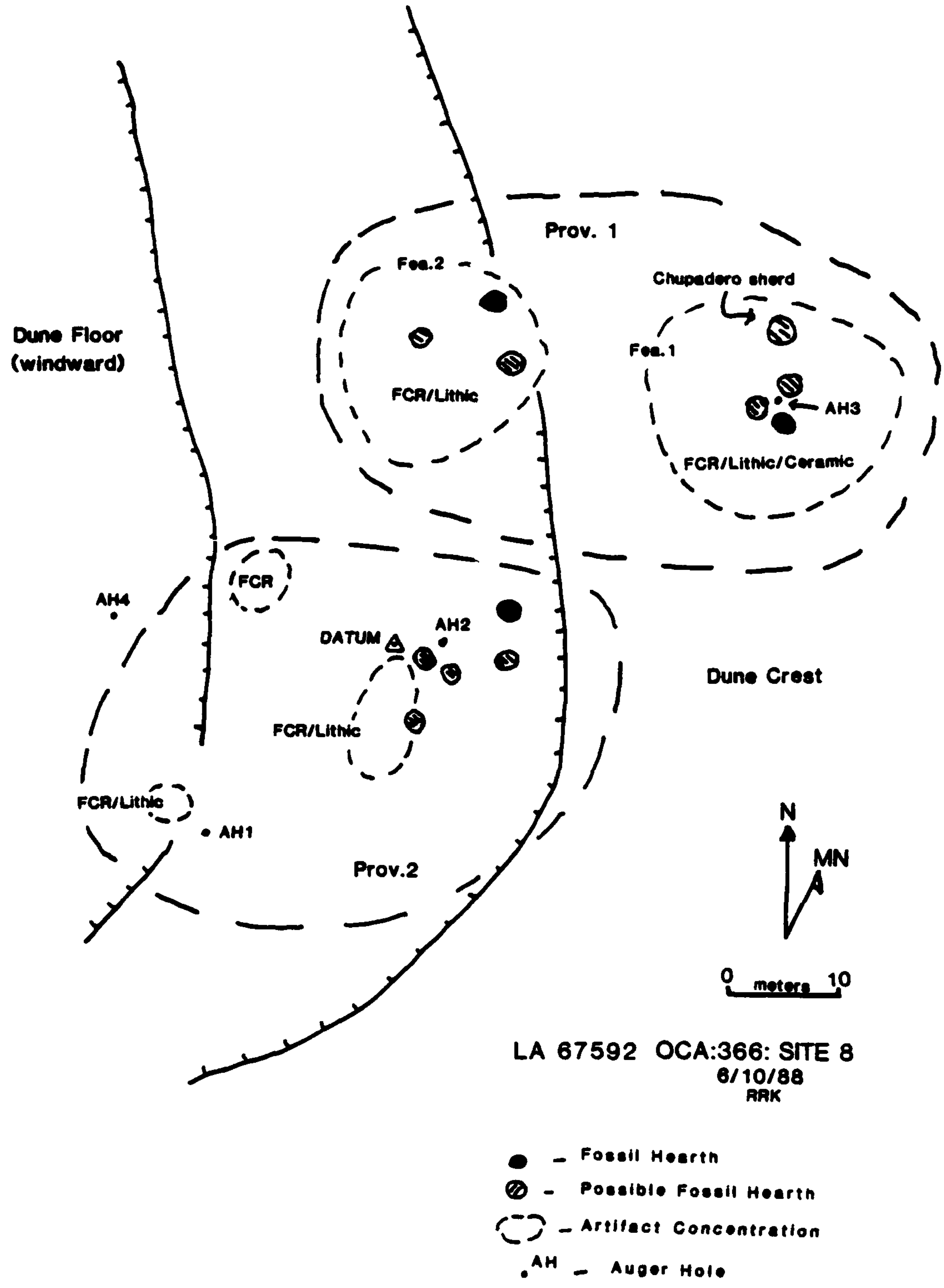
Whether these proveniences are related as one occupation (Late Formative) or not is unknown. The Chupadero Black-on-white on Provenience 1 indicates Dona Ana or El Paso Phase, as do Los Lunas smudged sherds. Provenience 2 must be designated as Lithic Unknown unless it can be positively associated with Provenience 1.

Artifact Assemblages. Provenience 1 lithics include debitage (ca. 50 percent flakes, 50 percent angular debris) and a few tools (pecking stone, core-pounder, retouched flakes) and exhibit fair material variety (Table 5.6). A piece of "mica" (probably selenite, a form of gypsum) was also recorded. Fire-cracked rock materials include limestone, pink and white quartzite, and schist. No ground stone tools were noted. Provenience 1 ceramics include one Chupadero Black-on-white and two sherds of a gray corrugated smudged interior ware (possibly Los Lunas smudged).

Provenience 2 lithics are angular debris and a retouched flake; fire-cracked rock materials are the same as Provenience 1.

Preliminary Evaluation. LA 67592 is one of only two ceramic sites in the Test Track survey area and has fairly diverse lithics, datable features, probable buried intact remains, and archeobotanical materials (Feature 2 is one of the largest charcoal and ash features noted on the survey). The site is limited in extent, but nonetheless has significant research potential.

Although no Test Track materials were noted on the site, materials from a Test Track mission conducted on June 8, 1988 were seen landing on the dune crest near the site. The site is not far from the Test Track centerline as extended into the impact area and is thus nearly on line with Test Track trajectories.



Prov. 1
Fea.2
FCR/Lithic
Chupadero sherd
Fea.1
AH3
FCR/Lithic/Ceramic
Dune Floor
(windward)
FCR
AH4
DATUM
AH2
FCR/Lithic
Dune Crest
FCR/Lithic
AH1
Prov.2
N
MN
0 meters 10
LA 67592 OCA:366: SITE 8
6/10/88
RRK
- Fossil Hearth
- Possible Fossil Hearth
- Artifact Concentration
AH - Auger Hole

Figure 5.6

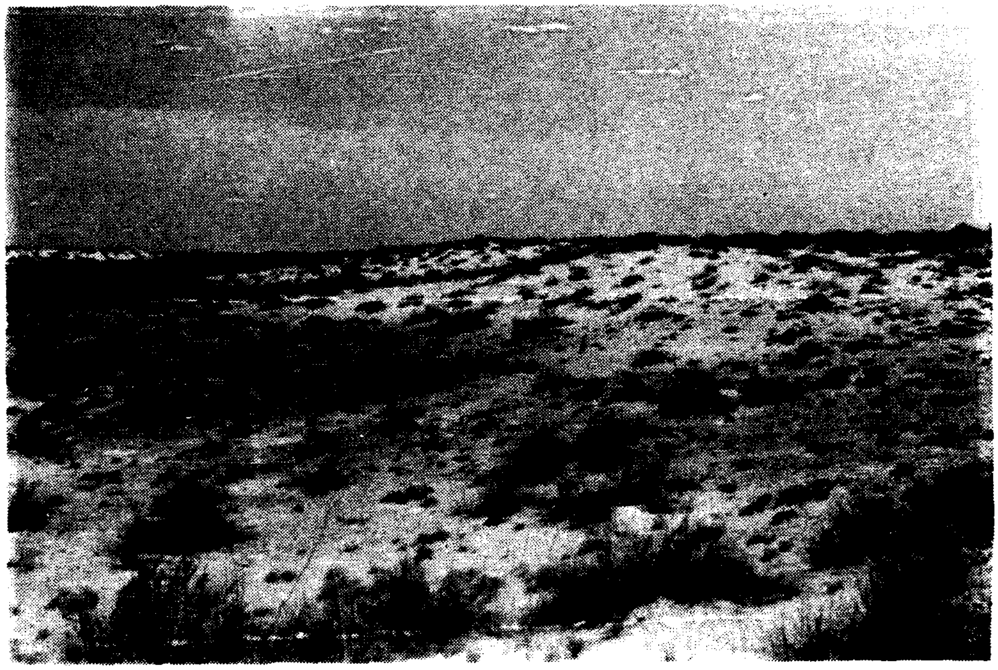


Plate 5.7. LA 67592; general view of site, Provenience no. 1 in background

Table 5.6 LA 67592 (field no. 8) Artifact types, materials and cortex

Material Type / Artifact Type

Frequency Column percent	Angular debris	Flakes	Irregular cores	Pecking stones	Retouched flakes	Manuport	Total
Altered sedimentary	0 0.00	0 0.00	1 50.00	0 0.00	1 50.00	0 0.00	2
Silt/claystone	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	1 50.00	1
Misc. chert	1 12.50	3 42.86	1 50.00	0 0.00	1 50.00	0 0.00	6
Quartzite	3 37.50	0 0.00	0 0.00	1 100.00	0 0.00	0 0.00	4
Quartzitic sandstone	0 0.00	1 14.29	0 0.00	0 0.00	0 0.00	0 0.00	1
Limestone/carbon	3 37.50	3 42.86	0 0.00	0 0.00	0 0.00	0 0.00	6
Schist	1 12.50	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	1
Selenite	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	1 50.00	1
Total	8	7	2	1	2	2	22

Percent Cortex

CORTEX	Frequency	Percent
None	15	68.2
15	1	4.5
20	1	4.5
30	1	4.5
65	1	4.5
100	3	13.6

LA 67593 OCA:366-9)

Site Type, Location and Setting. LA 67593 (Fig. 5.7, Plate 5.8) is a single provenience Formative site located on the front (leeward) crest of a lichen-stabilized dune in the dune zone, overlooking the sandy upland flats. The site has a good view of the LA 67591 dune remnant. An extensive area of semi-stable dunes and typically associated vegetation is located to the north, but the site's vegetation is more like that of the lichen-stabilized flats with saltbush, grass, mesquite, and *Ephedra* dominant. The LA 67593 dune is part of a detached string of parabolic dune remnants.

Site Dimensions. Overall: 20x20 m. Only one provenience.

Provenience Designations and Features Present. The site consists of a large ash stain (Feature 1), scattered lithics (10), and ceramics (10), fire-cracked rock (45 or more), and several possible fossil hearths. Feature 1 is a circular ash stain 3-5 m in diameter, which is surrounded by lithics, ceramics, and fire-cracked rock. The center of Feature 1 contains a burned gypsum remnant with charcoal and ash. Feature 1 is eroding but a substantial portion of it remains intact. A scatter of fire-cracked rock and possible fossil hearths was also noted on the front slope of the dune to the southeast.

Auger Hole #1 was placed 3 m northeast of Feature 1 in a small coppice dune. No stains or other cultural evidence was found, but a reddish sand was encountered at the same level as Feature 1.

Artifact Assemblages. Lithics at LA 67593 (Table 5.7) include debitage (angular debris and flakes) and a graver or scraper), one core, and two unifaces or possible scrapers). Fire-cracked rock is mostly limestone. The ceramic assemblage consists of five or more sherds of unspecific brown, and five sherds of painted El Paso Brown. The sherds appear to represent one or possibly two vessels; all are jar sherds. The types present indicate a late Mesilla, Dona Ana, or El Paso phase affiliation. The site's small size suggests a single occupation.

Preliminary Evaluation. LA 67593 is one of only two ceramic sites in the impact area and contains at least one datable feature with probable archeobotanical remains, and a fairly diverse lithic assemblage. The site is unique in being located on the front, or leeward side of a dune structure in fairly stable deposits.

Plate 5.8. LA 67593; view north across Feature 1

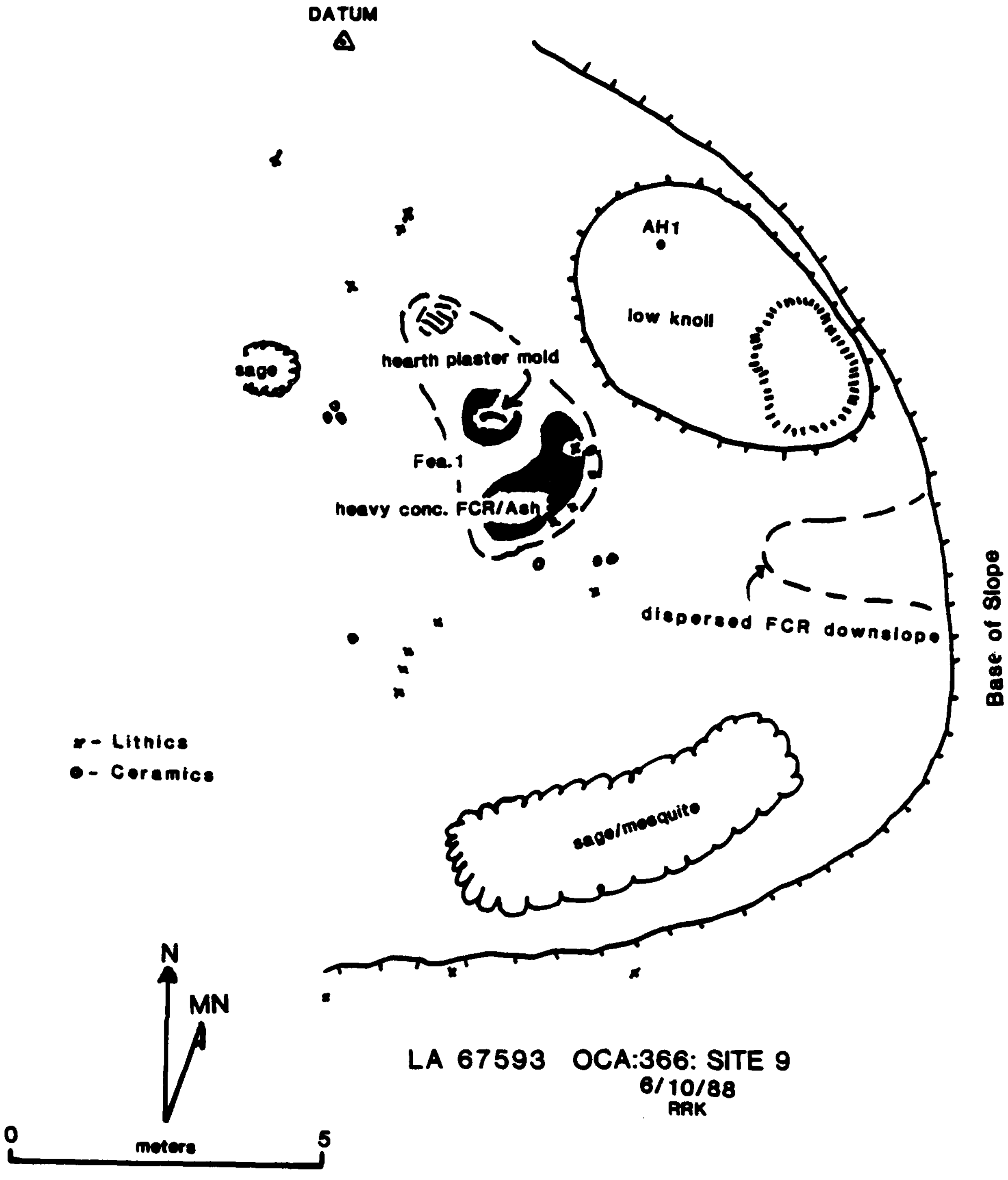

DATUM
AH1
low knoll
sage
hearth plaster mold
Fea. 1
heavy conc. FCR/Ash
dispersed FCR downslope
Base of Slope
sage/mesquite
- Lithics
- Ceramics
N
MN
0
meters
5
LA 67593 OCA:366: SITE 9
6/10/88
RRK

Figure 5.7

Table 5.7 LA 67593 (field no. 9) Artifact types, materials and cortex

Material Type / Artifact Type

Frequency Column percent	Angular debris	Flakes	Irregular cores	Unifaces	Gravers	Total
Altered sedimentary	0 0.00	0 0.00	1 100.00	0 0.00	0 0.00	1
Pedernal chert	0 0.00	1 33.33	0 0.00	0 0.00	0 0.00	1
Misc. chert	2 66.67	1 33.33	0 0.00	1 50.00	1 100.00	5
Limestone/ carbonate	1 33.33	1 33.33	0 0.00	1 50.00	0 0.00	3
Total	3	3	1	2	1	10

Percent Cortex

CORTEX	Frequency	Percent
None	10	100.0

LA 67594 (OCA:366-10)

Site Type, Location and Setting. LA 67594 (Figure 5.8) is a late Formative site located on the windward (west) side of a small, isolated parabolic dune remnant overlooking the upland flats and Allen Draw. More extensive outcrops of the parabolic dune zone are located nearby. Mesquite, sand sage, and *Ephedra* are the dominant vegetation types present. The site was discovered just outside the survey area in the course of determining the survey area boundaries, and was briefly recorded due the presence of well-preserved hearths and numerous ceramics.

Site Dimensions. Overall: Approximately 30x30 m.

Provenience Designations and Features Present. The site is approximately 30 meters in diameter, and occupies the western slope of the dune with no artifacts or features observed either on the dune crest or floor. Three definite hearths were noted, each containing abundant ash and charcoal as well as burned gypsum. Each of these hearths is 10 to 20 cm thick and 50 cm in diameter. Two possible fossil hearths were also noted.

Artifact Assemblages. In descending order of estimated abundance, the artifact assemblage consists of fire-cracked rock, lithics, and ceramics. Hundreds of pieces of limestone fire-cracked rock fragments were noted clustered in numerous small concentrations as well as diffusely across the site. Numerous chert and chalcedony flakes (estimated at 20-100) were also noted in a diffuse scatter across the site. One large bowl sherd of "unspecified brownware" (with characteristic "popcorn" temper consisting of large fragments of white rock) was noted within 50 cm. of one of the definite hearths.

A historic component of the site was also noted. Two brown glass bottles were found approximately 25 m to the southeast of center of the site. These bottles are intact, cubical in shape, and measure 2.5 to 3 inches on a side. The orifice diameters of the bottles are approximately one inch and the necks are short (ca. 1/4 inch). No writing is evident on either bottle. The bottles' closure is either by stopper or snap-off lids (lips are everted). The bottles are reminiscent of pre-1960 chemical or medicinal pill bottles. No other historic material was noted in the vicinity of the site.

Preliminary Evaluation. The condition of the site is remarkably good and preservation of the hearths is generally better than at sites located within the survey area. There is no evidence of vandalism or human disturbance. The site does appear to be in the process of eroding from the dune. The hearths are being pedestaled as the sand surrounding them is deflated.

The site's large lithic and ceramic assemblages, and well-preserved hearths give it significant research potential. In addition, it is unique in being the only ceramic site located in the area which is associated with an isolated dune remnant.

LA 67594 is located outside the Test Track impact area almost 90 degrees off the Test Track centerline and is thus not in much danger from Test Track activities.

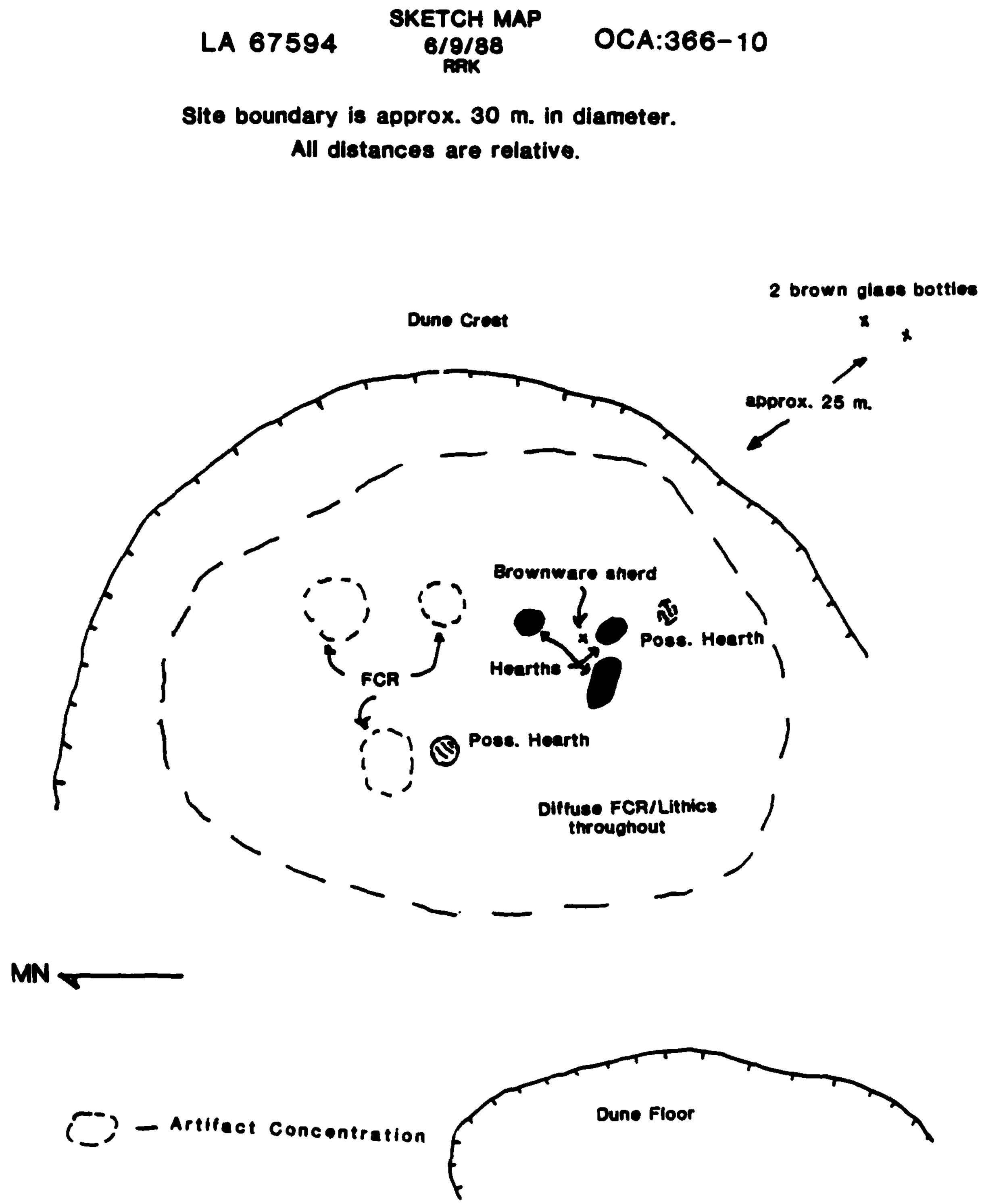

LA 67594
SKETCH MAP
6/9/88
RRK
OCA:366-10
Site boundary is approx. 30 m. in diameter.
All distances are relative.
2 brown glass bottles
Dune Crest
approx. 25 m.
Brownware sherd
Poss. Hearth
Hearths
FCR
Poss. Hearth
Diffuse FCR/Lithics throughout
MN
Dune Floor
— Artifact Concentration

Figure 5.8

Prehistoric Isolated Manifestations

Two categories of prehistoric isolated manifestations were documented during the Test Track impact area survey: (a) lithic artifacts and (b) isolated features consisting of fire-cracked rock and/or possible or definite fossil hearths.

Fourteen lithic artifacts were found in 12 separate locations (Table 5.8). All are debitage of various materials (mostly miscellaneous cherts) or manuports (unmodified stones too large to occur naturally in eolian contexts). Exceptions to this pattern consist of a single biface (Isolate No. 1) and late Archaic Projectile Point (Isolate No. 27, collected). Perhaps the most interesting of the isolated lithics is an occurrence of three biface thinning flakes (Isolate No. 30). All were of the same fine-grained, light gray chert, and clearly from the same reduction event. They were found with a 10 m area on the surface of well-stabilized (lichens) deposits west of the parabolic dunes zone. The area around them was carefully inspected, and no evidence of other artifacts or features was found.

The 22 isolated features (Table 5.9) all consisted of some form of evidence for the use of hearth facilities. Eleven of the recorded isolated features are fire-cracked rock scatters or individual pieces. Another eight features are possible or definite fossil hearths which lack associated artifacts or fire-cracked rock. One of these (Isolate No. 48) is a large fossil hearth with abundant charcoal and ash which is exposed in the side of a small, incised side drainage on the north side of Allen draw. It is covered by ca. 1 m of sediments, and is currently undergoing active erosion. The remaining portion is quite intact, however. All of the possible hearths consist of low, sometimes pedestaled, mounds of hardened gypsum similar to the suspected hearths found on several of the recorded sites.

Finally, three of the isolated features are apparent fossil hearths with associated artifacts. One of these (Isolate No. 40) was found after the survey, and consists of several possible hearths and a few unspecific brownware sherds, indicating a Formative period affiliation. The other two (Isolate Nos. 39 and 55) are definite fossil hearths with associated fire-cracked rock.

By far, most of the lithic isolated manifestations were found in the parabolic dunes zone The next most common context is the drop-off zone between the upland flats and the drainage bottom of Allen Draw. Those found in the flats zone were all near either the drop-off zone or the parabolic dunes. (Note: Locations of the individual isolated manifestations can be found on topographic maps delivered to the Albuquerque CE.)

The isolated features, on the other hand, are limited almost entirely to the parabolic dunes zone. A few isolated fire-cracked rocks were found in the the drop-off zone between the upland flats and Allen Draw. All of the isolated fossil hearths (with or without artifacts) were found in the dunes zone.

In general, the prehistoric isolated manifestations are similar in content to the recorded sites, consisting of lithics, hearth features, and a very few ceramics. Of potential significance is the fact that whereas, at sites lithic artifacts generally outnumber features, features are more common among the isolate assemblage. This phenomenon may simply be a function of the greater overall visibility of features. On the other hand, it may reflect functional differences in the nature of the activities responsible for isolated manifestations.

Another similarity with the prehistoric sites can be found in a general association with the parabolic dunes zone. Although a few isolated manifestations were found in the area of the upland flats drop-off to Allen Draw, the rest, for the most part, are located on or near the dunes. The apparent lack of prehistoric sites and isolated manifestations from the upland flats and the drainage bottom is a significant distributional pattern which requires explanation.

Table 5.8. Holloman Test Track Survey Isolated Lithic Items

Isolate Number	Artifact type	Material type	Condition	Cortex %	Platform type	Length	Width	Thick
1	Biface	Misc. chert	Medial	N/A	N/A	.	.	6
3	Manuport	Conglomerate	N/A	N/A	N/A	.	.	.
8	Flake	Misc. chert	Complete	30	Collapsed	32	35	5
18	Manuport	Quartzite	Unknown	100	N/A	.	.	.
21	Manuport	Quartzite	Unknown	N/A	N/A	.	.	.
22	Flake	Altered sedimentary	Medial	N/A	N/A	30	20	9
24	Flake	Sil. wood: good	Complete	10	Single facet	20	47	7
26	Angular debris	Granite	Unknown	None	N/A	.	.	.
27	Proj. point	Misc. chert	Distal	None	N/A	.	.	.
30	Flake-bif.thin.	Misc. chert	N/A	None	N/A	8	15	2
30	Flake-bif.thin.	Misc. chert	N/A	None	N/A	11	18	2
30	Flake-bif.thin.	Misc. chert	N/A	None	N/A	12	20	3
35	Manuport	Limestone/carbonate	N/A	N/A	N/A	.	.	.
49	Angular debris	Altered sedimentary	Unknown	None	N/A	31	19	9

Table 5.9. Holloman Test Track Survey Isolated Features

Isolate Number	Feature Description	FCR Count	Comments
11	Fire-cracked rock scatter	0	Pink quartzite
8	Fire-cracked rock	1	Caliche
9	Fire-cracked rock	1	Chert
29	Fire-cracked rock	29	Limestone
30	Possible fire-cracked rock spall	1	Quartzite
33	One fossil hearth	0	No artifacts; hearth in W dune face, S of Site 4
34	Fire-cracked rock scatter	10	With 3 possible fossil hearth remnants
36	Possible fossil hearth	0	No artifacts; on dune arm at base
37	Fire-cracked rock scatter	6	Limestone
38	3-4 possible fossil hearths	0	
39	Isolated fossil hearth w/FCR scatter	3	Limestone FCR
40	Several possible fossil hearths, and assoc'd ceramics	0	No FCR, or lithics; 4 unspecific brownware sherds
41	Fire-cracked rock	1	Limestone
42	Possible fossil hearth	0	On dune crest
25	Fire-cracked rock	1	Limestone
43	Five possible fossil hearths	0	No artifacts
46	Four possible fossil hearths	0	No artifacts
48	One fossil hearth	0	In arroyo cut, with ash and charcoal
49	Fire-cracked rock	1	
52	Fire-cracked rock	0	Limestone
53	Possible fossil hearth	0	No FCR, artifacts Very hard pedestals
55	Definite fossil hearth and FCR	0	On front of dune crest

Historic Sites

Descriptions of the two historic dump sites, documented during the Test Track survey appear below. The sites' artifact assemblages are listed in Appendix 4.

LA 67586 (OCA:366-2)

Site Type, Location and Setting. LA 67586 (Figure 5.9, Plate 5.9) is a single provenience historic dump with four more or less artifact class-specific localizations which may represent separate dumping events. The site is located in the semi-stable upland flats zone, not far from an existing dirt road and telephone pole line.

Site Dimensions. Overall: 40x30 m. Only one provenience.

Features and Artifacts Present. The four refuse localizations include:

(1) West of the datum: several paint cans (one with dark green or olive drab dried paint) and possible tar drums (Plate 5.9).

(2) To the west of (1): a scatter of food and drink cans including possible military K-ration cans, church key opened beer cans, two or more "cone top" beer cans, and a number of jelly tins.

(3) Just southwest of the datum: a concentration of construction hardware debris including nuts, bolts, and a variety of small miscellaneous metal items.

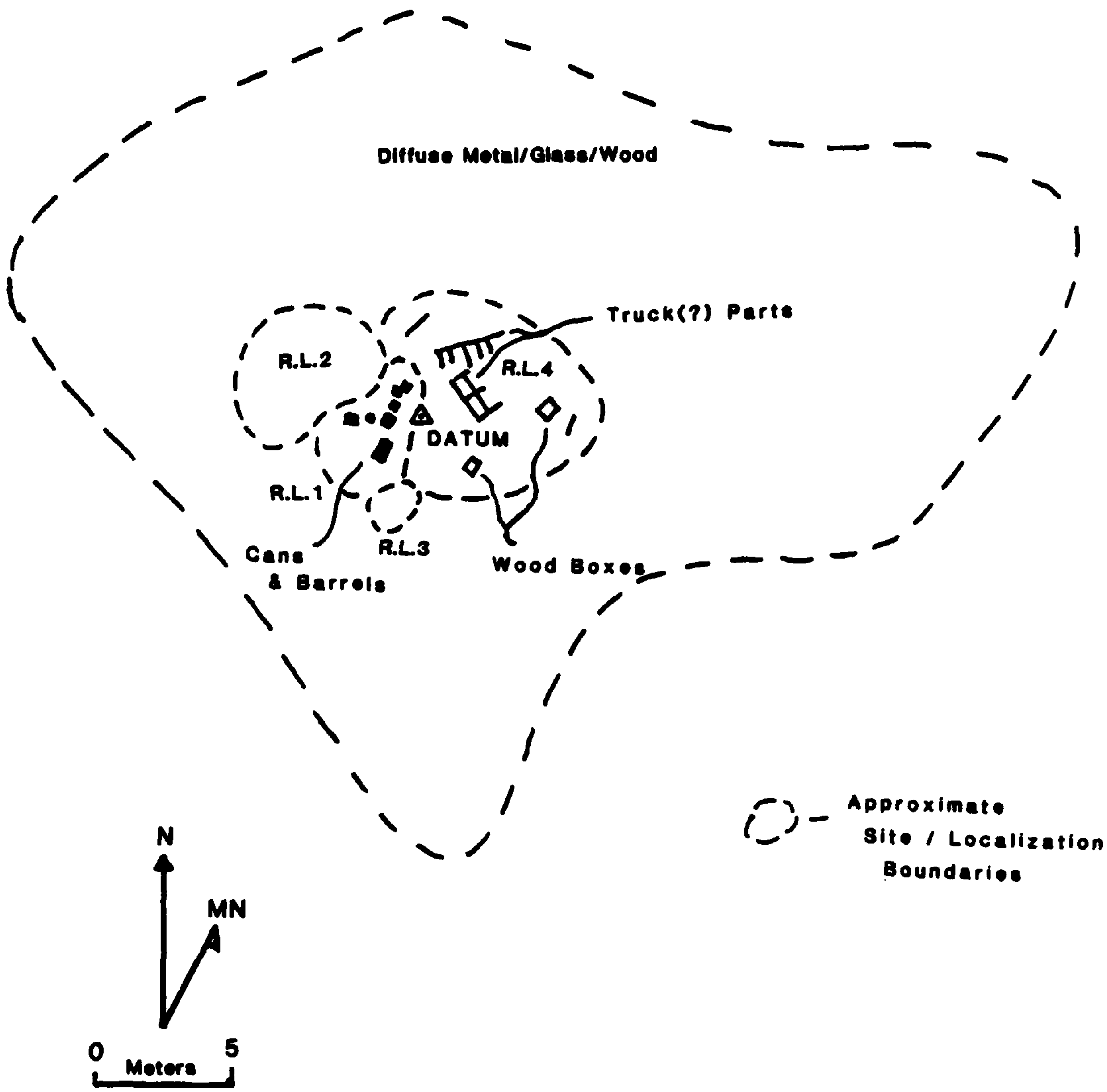
(4) East of the datum: a scatter of wood and metal. All are of unknown function. The wood includes a possible picket fence and two wood boxes (70 cm across). The metal includes a railing, possibly sides for a truck. Also present is a scatter of wood planks, cans, and broken glass.

The glass assemblage is limited but includes a Clorox bottle, a clear lantern globe, a ketchup or taco sauce bottle, and a snap top jelly jar. Also noted were a mop handle, military canvas strap buckle, canned milk cans and round wire nails and some later telephone line related trash to the west.

The site's age estimate is 1940-1950, and the dump is probably associated with early military activities in the area. The site was not augered, but it clearly has little, if any, depth.

Preliminary Evaluation. The origin of the site, which is definitely a dump, is uncertain. The nearest source is Guilez Springs where the Guilez family reportedly lived prior to the beginning of military activities in the 1940s. Although unconfirmed, the military reportedly used the area to house refugee German scientists following the second World War. The trash at LA 67586 may relate to refurbishing of the Guilez place or construction of other facilities (observation and communications buildings) located nearby. The Guilez Springs area lies only 740 m away.

Archival research and interviews would suffice to determine any possible relation between the site and the reported housing of German scientists on White Sands Missile Range. Collection and analysis of diagnostic artifacts might also be required.



R.L.- Refuse Localization

OCA:366: SITE 2 LA 67586
6/7/88
RRK

Figure 5.9

Plate 5.9. LA 67586; can scatter and barrels

LA 67590 (OCA:366-6)

Site Type, Location and Setting. LA 67590 (Figure 5.10) consists of two trash dumps (Proveniences 1 and 2) in located a semi-stable dune area. The site probably dates to the post-World War II era, ca. 1944-1950. Refugee German scientists were reportedly being housed one mile northeast of this site at Guilez Springs.

Site Dimensions. Overall: 100x50 m.
Provenience 1: 20x10 m. Provenience 2: 20x10 m.

Provenience Designations and Features.

The site consists of two trash dumps. Provenience 1 is located on the bottom of a stabilized amorphous dune. Provenience 2 lies 100 m south of Provenience 1 at the base of an east-facing stabilized dune slope.

Artifact Assemblages

Provenience 1 consists of a 55-gallon drum which contained tar as well as a scatter of domestic trash. The dump contains light bulb fragments, bottle shards, condiment and liquor bottles, broken hotel ware (plates and cups), bone, and eggshells. A milk can whose ends had been opened and folded inside as was done during WWII for the purposes of metal conservation was also recorded. Additionally, there is a bomb casing with box fins and bits of metal and wire fragments.

Provenience 2 consists of two coal cinder dumps that include metal, melted glass and bottles, a civilian toothpaste tube and cologne bottle, and a bent but unfired 30.06-caliber shell casing with the bullet missing (1941). Nearby are two 1945 30.06-caliber shells which may have been used to shoot at the 55-gallon drum in Provenience 1. The assemblage consists primarily of civilian trash and very few military items .

Preliminary Evaluation. LA 67590 is largely intact. The site's interest and potential significance lie in its probable association with early post-war military activities on White Sands Missile Range, specifically the possible use of the Guilez Springs location for housing refugee German scientists. Archival research, interviews, and collection and analysis of diagnostic artifacts would serve to evaluate the origin of the site's contents.

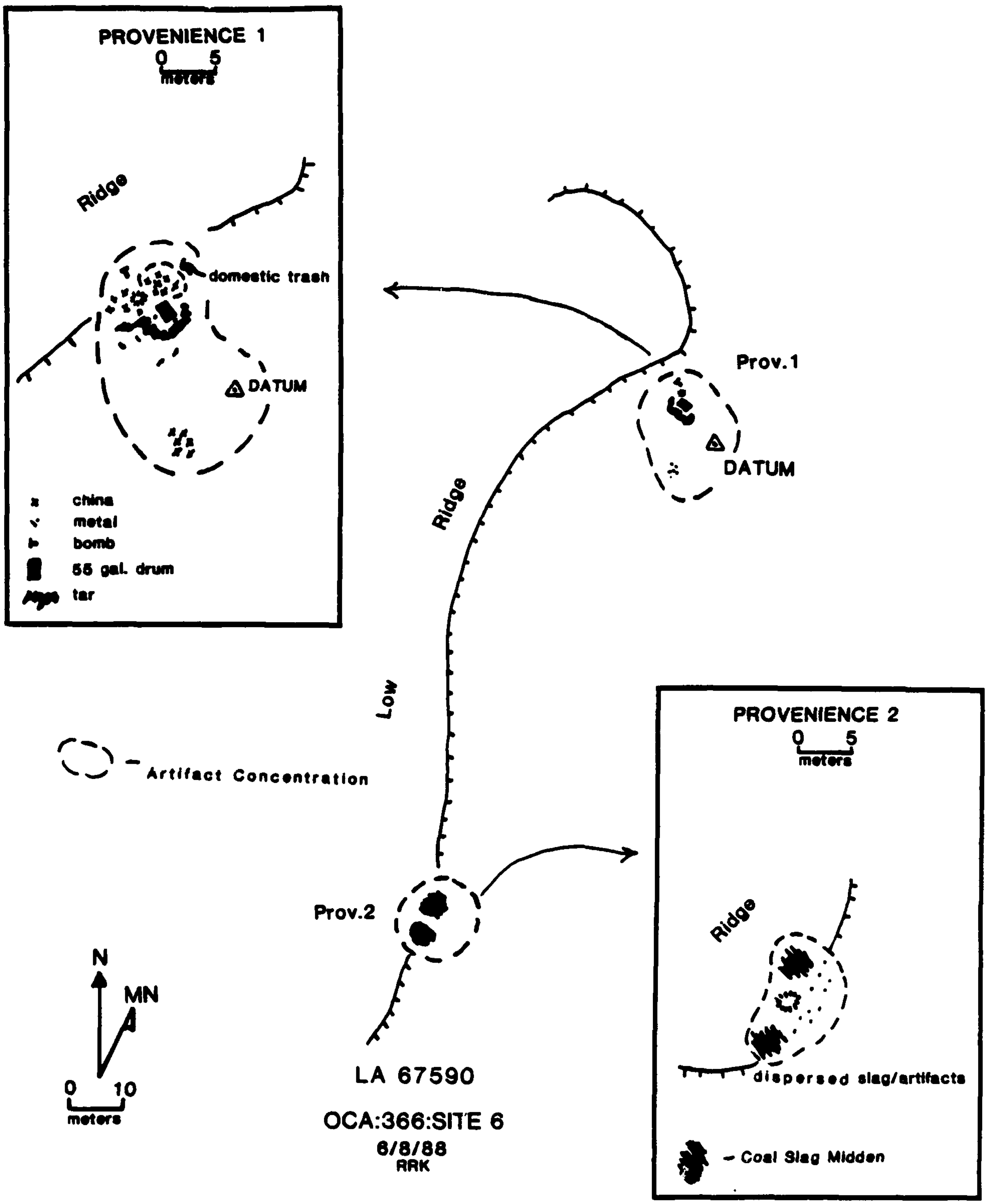

PROVENIENCE 1
0 5
meters
Ridge
domestic trash
DATUM
china
metal
bomb
55 gal. drum
tar
Prov.1
DATUM
Ridge
Low
Artifact Concentration
PROVENIENCE 2
0 5
meters
Ridge
dispersed slag/artifacts
Coal Slag Midden
Prov.2
N
MN
0 10
meters
LA 67590
OCA:366:SITE 6
6/8/88
RRK

Figure 5.10

Isolated Historic Materials

Table 5.10 is an inventory of the historic isolated manifestations recorded during the Test Track survey. All were determined in the field to definitely or probably date to the first half of the 20th century. Some, such as the World War II practice bombs (most found in the southwestern part of the survey area), clearly reflect early military use of the area. Others--horseshoes, principally--are in all likelihood related to pre-1940 ranching use of the area during the Anglo/Hispanic period. Most of the cartridges probably relate to this period also, but may be the result of post-1940 hunting by military personnel. Other items, such as the food jars and cans could represent either period. The purple glass at Isolate No. 6 and a hand-finished soda pop bottle (Isolate No. 32, collected) are probably the earliest of the historic isolated manifestations recorded. The hand-forged horseshoes (Isolate Nos. 2 and 13) may also be earlier than the rest of the isolates.

Many of the historic isolates found on the survey were associated with the drop-off area between the upland flats and Allen Draw. Many were also found on the drainage bottom, the flats, and in the dunes. A significant amount of post-1950 (but not recent) refuse is associated with a road and telephone line in the area also. Some post-1950s military trash was also found on the flats and in the dunes.

Altogether, the historic isolated manifestations assemblage is consistent with the known history of the area: pre-1940 ranching, followed by the area's use for military activities (bombing and gunnery range, Test Track missions, and possibly maneuvers). Also noted during the survey--but not recorded--was evidence of early use as a gunnery range. The most common items noted were 50-caliber machine gun shells and spent bullets, and large (ca. 1.5x5 inches) iron or steel artillery heads (antiaircraft?). The latter were flagged as possible ordnance.

Table 5.10 Historic Isolated Manifestations

Isolate Number	Artifact Description
2	Hand-forged fragmented horseshoe.
4	Two wooden fence posts, rusty barbed wire, possible corral.
5	Cartridges: 2 "WRA CO. #.38 WCF", solid head.
6	Purple tinted glass; 1 Kerr-type Mason jar, 1 broken mustard jar.
10	1 Kerr-type Mason jar lip.
11	Oil can, barrel hoop.
12	Unknown wooden door-like object.
13	Hand-forged fragmented horseshoe.
16	Commercial horseshoe, drawn.
17	Evaporated milk can.
19	Key-opened cylindrical can: 6" in length, 2.5" in diameter.
20	30-06 shell: "WCC #45".
23	Shells: "WCC #45", "LC 44".
28	Three pre-1950 meat cans.
31	One spring and jaw trap.
32	Pop bottle with hand-finished lip.
41	World War II practice bomb.
44	World War II practice bomb.
45	World War II practice bomb.
47	World War II practice bomb.
50	30.06 cartridge: "WCC/45".
51	World War II practice bomb.
54	Horseshoe.

Chapter 6

Summary, Evaluation, and Recommendations

Introduction

In this chapter, the results of the Holloman Test Track archeological survey are summarized, compared with the results of recent research elsewhere on the Tularosa Basin floor (the Border Star 85 and GBFEL-TIE projects), and evaluated in terms of their potential to contribute to local and regional research questions. Finally, the potential effects of on-going Test Track activities on the cultural resources is discussed, and specific recommendations are made.

Locational patterning, and variations in assemblage composition by time period are used to identify (a) the principal implications of the impact area's cultural remains, and (b) area-specific research questions generated by the survey. The Test Track impact area's prehistoric cultural remains are compared with those from the Border Star 85 and GBFEL-TIE projects in terms of the patterning discovered during the survey for the purpose of evaluating their research potential from a more regional perspective. Based on this evaluation, and site-specific data, recommendations are made concerning the management of the impact area's cultural resources.

Basis for Significance Evaluation and Recommendations

The approach to significance evaluation adopted here is based on the philosophy espoused in Stuart and Gauthier's *Prehistoric New Mexico* (Stuart and Gauthier 1981), and emphasizes the "research potential" of cultural resources as they relate to existing research issues and questions, including those generated by the survey itself. Uniqueness, preservation and artifact abundance, all contribute to evaluations of significance. The individual cultural remains of the Tularosa Basin floor, however, often lack these attributes, but make up for this lack in their ubiquity. This ubiquity is in all likelihood a function of the general conditions of refuse production--extraction processing--and is a testament to the importance of these activities in the past.

It has been argued elsewhere (Schutt et al. 1988) and in Chapter 3 that such resources can reveal much about the prehistoric use of the basin floor through (a) analysis of large-scale distributional data (including isolated manifestations), and (b) detailed surface recording and excavation of selected locations. The goal of distributional analyses is to ascertain large-scale environmental patterning in landscape usage, while that of excavation is primarily to gather detailed data concerning chronology, smaller-scale activities, and the construction and use of features for processing or residential purposes.

The prehistoric cultural remains encountered during the Test Track survey are too sparse and too localized to provide useful input to sophisticated distributional analyses. This fact reflects a major difference between the cultural resources of the Test Track impact area, and those of the Border Star 85 and GBFEL-TIE project area to the south. Whereas archeological remains are diffuse and ubiquitous in the latter areas, they are clearly concentrated into fairly easily defined sites in the Test Track survey area.

As small, isolated *sites*, the Test Track sites can be profitably viewed as *places* whose occupational histories can be evaluated using the second approach--detailed data recovery. Even though questions exist concerning the degree to which small assemblages represent multiple-episode origins (Ebert 1986), small sites have the greatest possibility of representing truly "episodic" occupations (Talmage, et al. 1977). This fact alone gives small sites significance in areas such as the Tularosa Basin floor which often contain a highly mixed surface archeological record. In essence, small sites may offer inexpensive "glimpses" of the past, or they may shed light on the continuing problem of the temporal integrity of assemblages in eolian environments.

Given that cultural remains in the Test Track impact area exhibit a markedly different distributional structure from those to the south, and that they conform easily to the traditional site concept, their research potential will be evaluated (a) as archeological places, and (b) in terms of how differences between them and previously recorded cultural remains on the Tularosa Basin floor can contribute to a better understanding of the area's prehistoric use.

Each site's research potential will be evaluated in terms of the site's overall uniqueness, age, state of preservation, potential for intact deposits, environmental and geomorphic context, presence of features, chronometric potential, presence of organic remains, overall artifact density and variety, and functional indicators of tool reduction and use, and ceramic utilization. In addition, an attempt will be made to assess the relative danger posed by Test Track

activities. Finally, recommendations will be made concerning the best treatment of each site, based on the above considerations. Recommended treatments will include *excavation, surface collection and testing*, or *no treatment.*

It is OCA's position that the nature of Test Track activities precludes accurate statements of anticipated project impacts on specific cultural resources, and that it may be the responsibility of the Albuquerque CE, in consultation with the Holloman AFB Test Track Division to make final determinations of potential impacts. OCA's assessments of potential impacts are discussed later in this chapter.

Summary of Test Track Impact Area Cultural Resources

Nature and Kinds of Cultural Resources

A total of eight prehistoric and two pre-1950 historic sites were discovered and recorded during the Test Track impact area survey. In addition, 55 isolated manifestations (plus 25 prairie-dog towns) were documented. The isolates consisted of 14 prehistoric lithics, 22 prehistoric features, and 23 historic artifact areas.

While the presence of historic remains is hardly surprising, previous work in the Holloman AFB area suggested that prehistoric archeological remains were particularly scarce (the original expectation was that less than four prehistoric sites would be encountered). The occurrence of roughly twice the expected number of prehistoric sites is clearly due to the presence of extensive semi-active and active gypsum dune deposits in the survey area. This increased site density conforms to a pattern originally documented by Eidenbach and Wimberly (1980) at White Sands National Monument. Their study revealed that, while the main portions of the White Sands dune complex was devoid of cultural remains, the "parabolic dune periphery"--consisting of disconnected parabolic dunes--contained numerous sites, artifacts, and numerous examples of the characteristic burned gypsum hearth casts referred to as *fossil hearths* in this report.

Nine of the recorded sites lie within the Test Track impact area, while another site located just outside the survey boundary was recorded and assigned a Laboratory of Anthropology number (LA 67594) due to its unusual state of preservation and proximity to the survey area.

Three of the prehistoric sites have been classified as Lithic Unknown (no diagnostic artifacts present). Two sites are late Archaic in age, and three date to the Formative (probably late) period. Age estimates are based on the presence of diagnostic artifacts, and are intended to serve more as a guide in evaluating than as definite age determinations.

The prehistoric and historic sites documented during the survey are relatively small, and rarely exceed 100 m (330 ft.) in overall dimensions. Among the prehistoric sites, low density artifact scatters (chipped stone and occasional ceramics), fire-cracked rock (FCR), and definite or possible fossilized gypsum hearth casts are the most common remains present. All appear at least somewhat eroded. Extremely limited augering of site deposits failed to yield buried materials or organic stains. The eolian context of the sites, however, suggests that at least limited buried deposits are present at all but the historic sites.

Both the historic sites recorded are isolated surface trash dumps which appear to date to the earliest military use of the White Sands area in the 1940s. Their proximity to the Guilez Springs area just northeast of the impact area suggests that they may relate to the use of that area to house refugee German scientists following World War II.

No positively identified Paleoindian, Apachean, or Anglo/Early Hispanic sites were encountered, although mid-late 19th century bullet casings found at one site in the dunes zone may reflect limited use of the area for hunting by either Apaches or Anglo/Hispanic ranchers during that period.

Isolated manifestations recorded on the survey consisted of 14 lithic artifacts, 22 fire-cracked rock and/or fossil hearth features, 23 historic artifact occurrences, and 25 prairie dog towns. (The latter were recorded to aid in environmental planning as a clue to the potential occurrence of the black-footed ferret in the project area.)

Table 6.1 lists the prehistoric and historic sites found on the Test Track impact area survey and their important characteristics (estimated age, environmental setting, dimensions, condition, and features and artifacts present).

Locational Patterning

As noted in Chapter 5, both prehistoric sites and isolated manifestations exhibit a strong association with active or semi-active dune contexts. Although isolated manifestations also occur along the drop-off from the uplands to the bottom of Allen Draw, prehistoric sites are all either located in the parabolic dunes zone or on isolated dune remnants. This fact, together with the rather simple topographic structure of the survey area--divided into the

Table 6.1 Holloman Survey Prehistoric and Historic Site Characteristics

Prehistoric Sites

LA Number	Field No.	Environmental Setting	Condition	Estimated Age	Total Area (m^2)	Hearth Features	Total Lithics	Total Ceramics	Total FCR
67585	OCA:366-1	Isolated dune	Eroded	Lithic Unknown	2600	0	21	0	90
67587	OCA:366-3	Parabolic dune	Some erosion	Lithic Unknown	1700	15-20	3	0	<10
67588	OCA:366-4	Parabolic dune	Some erosion	Late Archaic	6000	16	13	0	30
67589	OCA:366-5	Parabolic dune	Some erosion	Late Archaic	3300	10+	53	0	250
67591	OCA:366-7	Isolated dune	Some erosion	Late Archaic	8575	2+	24	0	200
67592	OCA:366-8	Parabolic dune	Some erosion	Late Formative	2250	9	22	3	175
67593	OCA:366-9	Parabolic dune crest	Some erosion	(L.?) Formative	400	1	10		
67594[1]	OCA:366-10	Isolated dune	Eroding	Late Formative	900	5+	20-100	<20	100s

Historic Sites

LA Number	Field No.	Environmental Setting	Condition	Estimated Age	Total Area (m^2)	Estimated Artifacts
67586	OCA:366-2	Upland flats	Intact	1940-1950	1200	100s
67591	OCA:366-6	Upland flats	Intact	1940-1950	400	100s

1. LA 67594 was discovered outside the survey area during boundary reconnaissance, and was briefly recorded due to its unique state of preservation.

dunes zone, the upland flats, and the drainage bottom--is responsible for the differences between archeological distributions in the Test Track impact area and those documented for the Border Star 85 and GBFEL-TIE projects to the south.

The association between prehistoric remains and parabolic dunes is consistent with a similar pattern noted by Eidenbach and Wimberly (1980) in their reconnaissance of White Sands National Monument.Although Eidenbach and Wimberly did not inspect the "alluvial flats" zone(which corresponds to the upland flats of the Test Track impact area) it seems likely that, based on the Test Track survey results, few prehistoric remains would have been encountered.

Historic cultural resources, on the other hand, are found in *both* environmental contexts in the Test Track impact area. One historic site was found on the flats, the other in the dunes. Historic isolates are found in both situations as well. The differences between the distributions of prehistoric and historic remains poses an important question regarding the surface visibility of prehistoric materials in the upland flats.

The near absence of prehistoric isolates and sites from the upland flats zone is a significant finding of the survey. The existence of historic materials on the upland flats is in marked contrast to the near absence of prehistoric cultural remains. This fact, together with the discovery of a buried hearth at a location where the upland deposits are actively eroding, strongly supports the possibility that buried prehistoric cultural materials exist in the upland flats area. As noted in Chapter 2, the flats probably consist of older alluvial sediments with a mantle of essentially eolian materials. Since, physiographically, the area is part of a larger basin floor, the dominant depositional and geomorphic processes are probably accumulative rather that erosional. The surface stability of the flats zone, which appears to result from the cryptogamic lichens of the Holloman-Yesum soils, together with the relatively even topography, also suggests that, even though the sediments are predominantly eolian in origin, aggradation is the dominant process. Depending on the overall rate of accumulation, cultural remains of various ages may well lie buried in upland flats zone deposits. A detailed geomorphological study (or at least an expert assessment) would greatly aid in resolving this issue.

The possible differences in surface visibility of prehistoric remains notwithstanding, the association of archeological materials with the parabolic dunes and characteristic high vegetative diversity is also of great interest. Although Moore and Winter (1980) have shown that such an association is not automatic, such a pattern has been repeatedly demonstrated elsewhere in the southwest (e.g. Reher and Witter 1977; Irwin-Williams 1985; Irwin-Williams et al. 1988), as well as in the Tularosa Basin proper (Eidenbach and Wimberly 1980). Whether or not the prehistoric inhabitants of the area were attracted by this diversity (and whether or not it existed in the past) is uncertain. The association is nonetheless of obvious significance. The fact that both Archaic and Formative sites are present in the parabolic dunes indicates that the dunes played a role in local subsistence patterns for much of the area's prehistory.

Assemblage Composition

As indicated in Chapter 5, the predominant prehistoric artifact types present in the Test Track impact area are lithics and fire-cracked rock. Ceramics are rare and limited to two sites (a total of 13 recorded). Fire-cracked rock counts at sites range from less than 10 to 100s. Similarly, isolated manifestations contain fire-cracked rock or lithics for the most part. Most of the lithics encountered consist of debitage (72.3 percent of all site lithics) with an overall flake to angular debris ratio of ca. 1.4:1 (43 versus 30 percent of all artifacts). The next most common items are cores (7.6 percent overall), followed by unifacial tools (probably scrapers). Informal tools (debitage with limited retouch), pounding tools (hammers and peckers), and bifacial tools (including 3 projectile points), each make up about 3 percent of the overall assemblage. A drill, a possible graving tool, and a spokeshave were also found.

Lithic material types are typically difficult to distinguish with any reliability in the field, and it is perhaps not surprising that the most abundant type in the Test Track survey is *miscellaneous chert*. Most of the materials covered by this category, as well as the fossil cherts, probably originated in the San Andres or Sacramento Mountains, and should be collectively referred to as San Andres chert. Another possible source is outcrops of remnant Santa Fe formation gravels which occur in the southern basin; much of what was classified as *Pedernal chert* in the survey probably originated in these gravels (see Schutt and Chapman 1988 for a discussion of local material types). The next most abundant types are limestone carbonates which may well derive from the outcrops of Tularosa Peak just east of the Test Track impact area. Altered sedimentary types are also fairly common (8.9 percent overall) and may also have originated in the same outcrops. Limestone and volcanics--again, probably from Tularosa Peak--are the most abundant fire-cracked rock types. Exotic lithic materials (excluding the San Andres materials) are generally quite rare. No obsidian was found.

The overall debitage assemblage is characterized by later stages of reduction, as is evident in the absence of any cortex from roughly 75 percent of the artifacts. On the other hand, evidence of final tool production is limited to a very few artifacts with prepared platforms (seven total, including multi-facet, stepped, and ground). The only thinning flakes noted were found together as an isolated manifestation (Isolate No. 30).

Altogether, the Test Track lithic assemblage appears fairly expedient in nature, and consists largely of lithic materials from local sources. This is in keeping with a model of primarily foraging usage of the area.

The most notable absence from the assemblages is any form of ground stone. Only one possible (fragmentary and burned) ground stone artifact was noted during the entire survey. This fact stands in marked contrast to the popularity of ground stone in the Border Star 85 and GBFEL-TIE project area to the south. Given the facts that (a) the survey area sediments are continually being eroded and redeposited by eolian processes, and (b) the area has been subject to restricted access since the advent of military activities ca. 1945, total removal of the ground stone assemblage by souvenir collectors seems a remote possibility. Furthermore, much of the ground stone in the Border Star 85 and GBFEL-TIE project areas is fragmented almost beyond recognition as a result of reuse as hearth stones, and would be unlikely to attract a collector's attention. Thus, the absence of ground stone from the Test Track impact area assemblage appears to be a real phenomenon.

Because the artifact assemblages associated with the dune periphery sites recorded by Eidenbach and Wimberly (1980) are not reported, it unknown whether dune sites in that area also lack ground stone. The absence of grinding tools is remarkable, given their usual ubiquity at other southwestern sites. Their absence in the Test Track impact area is even more interesting given that ground stone sites were reasonably common in the lower portions of the Three Rivers drainage which lies just north and northeast of the survey area (Wimberly and Rogers 1977), and at least some ground stone was recorded on the Sargent York project at the northern end of the basin (Laumbach and Kirkpatrick (1985). If the absence is not a result of post-depositional factors, then it presumably reflects an important aspect of the use(s) prehistoric peoples made of the parabolic dunes zone. Finally, the association between the sites and the parabolic dunes and diverse vegetative community is even more puzzling given the usually assumed role of grinding tools in plant processing.

Temporal Variations

Even though the Test Track survey comprises only 1280 acres and 7 prehistoric sites (excluding LA 67594, outside the survey area), some temporal patterning in lithic assemblages is evident. Table 6.2 presents count and percent data for the isolated manifestations and site data grouped by general time period. (Time period assignments are based on the presence of diagnostic artifacts and are acknowledged to be tenuous.) The isolated manifestation data are presented for comparison, but the assemblage is too small to allow any definite conclusions.

The most obvious differences in the different period assemblages lie in the relative proportions of angular debris and flakes. At almost 50 percent of the combined Late Archaic assemblages, flakes appear to be significantly more common than among the grouped Formative assemblages where they constitute only 31 percent and are outnumbered by angular debris. The Lithic Unknown assemblage lies in between with angular debris slightly outnumbering flakes (38 percent). The overall proportion of debitage differs among the three groups, also. Debitage represents 71.5 percent of the Late Archaic lithic artifacts but only 65.7 percent of the Formative ones. Interestingly, the Lithic Unknown assemblages are composed of 81 percent debitage and do not fall in between the other two categories. This fact suggests that the Lithic Unknown sites are functionally different, regardless of their true temporal affiliations.

Significant variations in the less common artifact types are more difficult to identify. Cores range from 6.5-9.4 percent and are more or less the same for all three groups, while formal tools (including pounding tools) are roughly equal at Lithic Unknown and Formative sites (11-12 percent) and somewhat more common at Late Archaic sites (18 percent). The lack of larger samples precludes any firm conclusions, but the higher formal tool percentage for Late Archaic sites may reflect the performance of more residentially-oriented activities (e.g. processing and tool maintenance).

The higher proportion of flakes among the Late Archaic assemblages is taken as an indication of an increased emphasis on the later stages of tool production, a conclusion which is consistent with the overall lower proportion of cores (tool blank production). This pattern is partially repeated in Table 6.3 which shows variations in debitage attributes for the same time period groupings. Again, the isolated manifestations are presented for comparison, but the small sample does not allow for much discussion, especially since the assemblage is biased by the three biface thinning flakes from a single isolate.

Table 6.2 Holloman Survey Lithic Artifact Types by General Time Period

Isolates (Total=14)

Artifact type	Frequency	Percent
Angular debris	2	14.3
Flake	3	21.4
Flake-bif.thin.	3	21.4
Proj. point	1	7.1
Biface	1	7.1
Manuport	4	28.6

Lithic Unknown (Total=37)

Artifact type	Frequency	Percent
Angular debris	16	43.2
Flake	14	37.8
Tested rock	2	5.4
Core-irregular	1	2.7
Hammerstone	1	2.7
Uniface	1	2.7
Drill	1	2.7
Spokeshave	1	2.7

Late Archaic (Total=77)

Artifact type	Frequency	Percent
Angular debris	17	22.1
Flake	38	49.4
Core-irregular	5	6.5
Hammerstone	2	2.6
Pecking stone	1	1.3
Ret. ang. deb.	1	1.3
Retouched flk.	1	1.3
Proj. point	3	3.9
Biface	2	2.6
Uniface	5	6.5
Spokeshave	1	1.3
Unkn grndstone	1	1.3

Formative (Total=32)

Artifact type	Frequency	Percent
Angular debris	11	34.4
Flake	10	31.3
Core-irregular	3	9.4
Pecking stone	1	3.1
Retouched flk.	2	6.3
Uniface	2	6.3
Graver	1	3.1
Manuport	2	6.3

Table 6.3 Holloman Survey: Debitage Attributes by General Time Period

Isolates

Artifact type

TYPE	Frequency	Percent
Angular debris	2	25.0
Flake	3	37.5
Flake-bif.thin.	3	37.5

Material type

MATL	Frequency	Percent
Altered sedimentary	2	25.0
Misc. chert	4	50.0
Sil. wood: good	1	12.5
Granite	1	12.5

Cortex %

CORTEX	Frequency	Percent
None	5	71.4
10	1	14.3
30	1	14.3

Platform type

PLATFORM	Frequency	Percent
N/A	6	75.0
Collapsed	1	12.5
Single facet	1	12.5

N Obs	Variable	Label	Minimum	Maximum	Mean	Std Dev
8	LENGTH	Length	8.00	32.00	20.57	10.42
	WIDTH	Width	15.00	47.00	24.86	11.68
	THICK	Thick	2.00	9.00	5.29	3.09

Table 6.3 (cont'd) Holloman Survey: Debitage Attributes by General Time Period

Lithic Unknown

Artifact type

TYPE	Frequency	Percent
Angular debris	16	53.3
Flake	14	46.7

Material type

MATL	Frequency	Percent
Silt/claystone	4	13.3
Misc. chert	13	43.3
Chalcedony	6	20.0
Quartzite	4	13.3
Quartzitic sandstone	1	3.3
Limestone/carbon	2	6.7

Cortex %

CORTEX	Frequency	Percent
None	22	78.6
20	1	3.6
25	1	3.6
55	2	7.1
95	1	3.6
100	1	3.6

Platform type

PLATFORM	Frequency	Percent
N/A	15	50.0
Collapsed	5	16.7
Cortical	2	6.7
Single facet	5	16.7
Stepped	1	3.3
Ground	2	6.7

N Obs	Variable	Label	Minimum	Maximum	Mean	Std Dev
30	LENGTH	Length	10.00	60.00	25.27	13.26
	WIDTH	Width	10.00	39.00	21.17	7.95
	THICK	Thick	3.00	35.00	9.20	6.65

Table 6.3 (cont'd) Holloman Survey: Debitage Attributes by General Time Period

Late Archaic

Artifact type

TYPE	Frequency	Percent
Angular debris	17	30.9
Flake	38	69.1

Material type

MATL	Frequency	Percent
Altered sedimentary	7	12.7
Fossil chert	2	3.6
Pedernal chert	2	3.6
Misc. chert	26	47.3
Chalcedony	4	7.3
Quartzite	4	7.3
Quartzitic sandstone	2	3.6
Limestone/carbon	5	9.1
Feldspar	3	5.5

Cortex %

CORTEX	Frequency	Percent
None	31	75.6
2	1	2.4
5	2	4.9
17	1	2.4
19	1	2.4
20	3	7.3
60	1	2.4
100	1	2.4

Platform type

PLATFORM	Frequency	Percent
N/A	35	63.6
Collapsed	4	7.3
Cortical	2	3.6
Single facet	13	23.6
Multi-facet	1	1.8

N Obs	Variable	Label	Minimum	Maximum	Mean	Std Dev
55	LENGTH	Length	4.00	40.00	19.56	9.20
	WIDTH	Width	4.00	42.00	19.39	9.70
	THICK	Thick	1.00	22.00	6.46	4.23

Table 6.3 (cont'd) Holloman Survey: Debitage Attributes by General Time Period

Formative

Artifact type

TYPE	Frequency	Percent
Angular debris	11	52.4
Flake	10	47.6

Material type

MATL	Frequency	Percent
Pedernal chert	1	4.8
Misc. chert	7	33.3
Quartzite	3	14.3
Quartzitic sandstone	1	4.8
Limestone/carbon	8	38.1
Schist	1	4.8

Cortex %

CORTEX	Frequency	Percent
None	19	90.5
20	1	4.8
100	1	4.8

Platform type

PLATFORM	Frequency	Percent
N/A	10	47.6
Collapsed	2	9.5
Cortical	2	9.5
Single facet	6	28.6
Multi-facet	1	4.8

N Obs	Variable	Label	Minimum	Maximum	Mean	Std Dev
21	LENGTH	Length	8.00	70.00	28.90	16.06
	WIDTH	Width	5.00	50.00	23.24	12.10
	THICK	Thick	2.00	20.00	8.67	5.98

Data on debitage type, materials, cortex percent, platform attributes are presented in Table 6.3. The differences in flake-angular debris ratios discussed above are even more apparent, with flakes outnumbering angular debris 2.2 to 1 in the Late Archaic assemblages. Material variability appears to be greatest for the Late Archaic assemblages and least for the Lithic Unknown. This pattern may, to some extent, reflect differences in sample size, however. The proportion of higher-quality materials (cherts and chalcedonies) is considerably lower for the Formative period assemblages (38 percent) than for the other two (60-63 percent). This presumably indicates either reduced access to finer-grained materials, or perhaps a less complex (i.e. more expedient) tool kit.

Somewhat surprisingly, the cortex statistics in Table 6.3 suggest a greater emphasis on later stages of reduction for the Formative assemblages (90 percent with no cortex), whereas the Lithic Unknown and Late Archaic figures are 79 and 76 percent, respectively. The proportion of prepared platforms (multi-facet, stepped, and ground) is greatest for the Lithic Unknown (10 percent), and least for the Late Archaic (less than two percent). The Formative assemblages fall in between (5 percent). The figures are rather inconsistent with the flake-angular debris ratios and material type data, and are difficult to interpret.

Debitage dimensions, on the other hand, are consistent with a pattern of greater emphasis on later stage reduction. Length, width, and thickness are all greatest for the Formative assemblages and lowest for the Late Archaic. In fact, Formative debitage averages almost 10 mm longer and 2 mm thicker than the Late Archaic materials. This suggests that either later stages of reduction or different tool production technologies are present. Larger debitage resulting from tool manufacture would be expected of a more expedient Formative technology as suggested above by the materials data.

Overall, the Test Track lithic assemblages indicate that the Formative period differs from the Late Archaic one in terms of (a) a greater proportion of debitage overall and angular debris in particular, (b) a reliance on less fine-grained and more locally available materials, and (c) the production of larger debitage during tool manufacture. Together, these differences suggest a technology involving larger, more expedient tools and the use of more locally available materials. Ground stone tools are essentially absent from all the assemblages, and the one example was found at an Archaic site.

Features

A particularly interesting aspect of the cultural resources found during the Test Track impact area survey is the existence of numerous definite and possible so-called fossil hearths in the gypsum sands which make up the surface of the area and are the principal constituent of the parabolic dunes environmental zone. These features usually consist of low mounds or occasionally columnar pedestals of hardened, erosion-resistant gypsum. The definite ones are characterized by ash and charcoal staining and are often associated with other artifacts such as fire-cracked rock. The possible hearths lack organic stains but are functionally suggestive in terms of location and/or artifact associations.

Many of these features may be natural (those without artifacts), but a natural process to account for them has yet to be discovered. Familiarity with definite examples of the fossil hearth phenomenon during the course of the survey led the field crew to feel increasingly comfortable with identifications of fossil hearths, even when they occurred as isolated manifestations.

Samples of several definite hearths were taken for the purposes of determining whether or not the burned gypsum has sufficient remnant magnetism to allow dating using archeomagnetic methods. The results of this evaluation have not yet been received. One small (10 cm across) possible fossil hearth pedestal was also collected for evaluation in the laboratory. The results of this evaluation await inspection by someone more familiar with the phenomenon. It may be that even unstained burned gypsum contains microscopic organic materials which could confirm their origin as hearths. These possibilities should be examined in future work in the Holloman area.

The more definite hearths clearly represent the use of fire facilities in the area. Many are probably datable (radiocarbon) and contain at least limited amounts of archeobotanical remains. Many are associated with fire-cracked rock and other artifacts, and, together with the associated assemblages, should be capable of providing valuable information concerning the details of prehistoric use of the parabolic dune zone. Important questions which remain, include improving archeologists' ability to recognize and confirm these features, and their possible archeomagnetic dating potential.

Eidenbach and Wimberly (1980) analyzed both the number of hearths and site size (dimensions) at 32 fossil hearth sites in the parabolic dune margin; a total of 130 fossil hearths were found among these sites. Based on an observed bimodal distribution for both hearth count and site size, they concluded that a few sites (large and with numerous hearths) were repetitively occupied through time, while the rest appeared to represent more limited

occupations. They also found no difference between ceramic and aceramic sites. This analysis is interesting in light of the numerous apparent hearths present at two of the Test Track sites (LA 67587, LA 67588, and LA 67589), and the possibility that at two of these locations, extensive fossil hearth areas may have resulted in a "terrace" of sorts along the inner dune slopes. Redundant occupation of such locations should come as no surprise.

In any event, more research is required before the fossil hearth phenomenon can be completely understood, or even correctly identified.

Comparison of Test Track Cultural Resources with Border Star 85 and GBFEL-TIE Project Area

A considerable amount of archeological research has recently been conducted on the floor of the southern Tularosa Basin. Two extensive surveys (Seaman et al. 1986, Anschuetz and Doleman 1988a), have been followed by some of the first ever testing (Schutt and Chapman 1988), and excavation (Swift et al. 1988) projects. Other basin floor projects include the Ft. Bliss surveys of Carmichael (1986b) and Whalen (1977, 1978, 1980). The latter projects were located on the basin floor just south of the Border Star 85 and GBFEL-TIE project areas, between 60 and 100 km south of the Holloman Test Track impact area, and although they represent data from an environmental context comparable to the Test Track one (basin floor), they are located at a greater distance than the Border Star 85 and GBFEL-TIE project data.

Research in closer and more similar environmental contexts includes that conducted by Eidenbach and Wimberly (1980) in their reconnaissance of White Sands National Monument, and the Three Rivers drainage survey of Wimberly and Rogers (1977). Unfortunately, although the former survey included the parabolic dunes zone, quantitative data are limited, and the adjacent alluvial flats were not inspected. Furthermore, the Three Rivers survey included only a very small portion of the basin floor zone, and no sites were recorded for that zone. Thus, although comparisons are made where possible with the results of these surveys, the quantitative analyses presented below emphasize comparisons with the detailed data from the Border Star 85 and GBFEL-TIE projects.

Ultimately, of course, the cultural resources of the Test Track impact area must be understood and evaluated within a regional adaptive context. As noted in Chapter 3, however, extant settlement and subsistence models for the Tularosa Basin are based largely on excavation data from the basin periphery, and the role of the basin floor in local and regional adaptations will remain hypothetical until it can be tested. Thus the principal framework for evaluating cultural remains from the Test Track impact area concerns their information potential in terms of addressing questions of basin floor activities.

Some of the theoretical and substantive contributions of the Border Star 85 and GBFEL-TIE projects have been discussed in Chapter 3. The principal research findings are briefly summarized here, and compared with the Test Track survey data. Differences in certain basic environmental characteristics (surface topography, soils) and the small sample of cultural remains located during the Test Track survey preclude extensive comparisons, however.

Settlement Patterns

The structure of archeological distributions in these areas is diffuse and characterized by the existence of numerous isolated artifacts and features. Small sites are nearly ubiquitous, and excavations have confirmed that archeological remains constitute a "semi-continuous distribution" across the landscape. This distribution has been both obscured and revealed by recent accelerated erosion (last 100-150 years), thus creating the "small sites" problem (Doleman 1987a).

A second discovery is that significant archeological distributions are limited to topographic highs, especially those located near ephemeral ponds. Increasing densities of archeological materials are also found on the alluvial fans at the base of the nearby Jarilla Mountains. Finally, archeological distributions exhibit clustering and structure at several scales. These scales range from <=10 of meters (representing the "site structure" level of patterning), to 10s of meters (the blowout and "small sites" level), to 100s of meters (representing local topographic control of the distributions), and, finally, multiple kilometers. It is the latter scale at which "settlement patterns" governed by large-scale environmental variations of the sort noted in the Test Track survey become apparent (Doleman 1988c, Chapman and Doleman 1988).

Sites of the Formative periods appear to favor the alluvial fans and higher areas near the larger ephemeral ponds. Archaic remains, on the other hand are more common on the basin floor, and are probably present but obscured on the fans (Seaman 1986b).

When assemblage variety is corrected for the effects of sample size, sites with lower than expected variety tend to be found farther out on basin floor, suggesting more logistical and/or redundant use of the area, i.e. for foraging and

extraction rather than residence (Chapman and Doleman 1988). This implies that the central basin floor alone may be the best location to search for examples of the purely non-residential locations usually assumed to characterize the entire basin floor.

Assemblage Composition

Temporal variations in assemblage composition are evident in detailed data from Phase II of the Border Star 85 survey (Seaman 1986b). Compared with the Formative, Archaic assemblages exhibit greater material diversity and finer, more distant material sources are represented. In addition, the Archaic has a greater proportion of late stage reduction debitage. Evidence for this pattern includes thinner flakes, more platform preparation, more thinning flakes, and greater debitage-to-core ratios). Lithic Unknown assemblage characteristics generally lie between the extremes of Archaic and Formative, but tend towards the Archaic.

Spatial patterning with respect to materials sources is also evident. Material selection and reduction debitage attributes exhibit distinct patterning as a function of distance from the material source. For all time periods combined, later stages of reduction and more efficient reduction technology are emphasized in all "dull chert" assemblages as the distance from the source (Jarilla Mountains) increases.

Assemblage diversity and size are highly correlated for Formative sites, suggesting high residential mobility and interpretation of all sites essentially reflecting short-term residential activities (cf. Vierra and Doleman 1984). This suggestion is confirmed by comparing grouped small sites' assemblages with large reoccupied residential sites--no difference is evident. No relationship is evident, however, between diversity and assemblage size for isolated lithics (grouped by 500 m survey unit), suggesting the isolates are more redundant and extractive in origin.

Similarities and Differences

Environmental differences between the Test Track impact area and the Border Star 85 and GBFEL-TIE project areas to the south were revealed by the survey to be greater than anticipated. Given that Tularosa Peak is hardly comparable with the Jarilla mountains, it might be best to classify the Test Track area as true basin floor. Given the reduced assemblage variety characteristic of areas farther out on the basin floor in the GBFEL-TIE project area, this may help account for differences between the two areas in terms of both archeological distributions and assemblage composition.

The biggest differences between the Border Star 85/GBFEL-TIE project area and prehistoric remains from the Test Track area are (a) the latter's lack of ground stone, and (b) the highly aggregated nature of archeological remains in Test Track impact area. The absence of ground stone clearly represents a functional difference, while the discrete structure of the archeological record in the Test Track impact area may be (a) a function of environmental differences, or (b) result from the lower visibility of buried remains in the upland flats area.

The Test Track data, on the other hand, tend to corroborate temporal differences in assemblage composition. As in the case of the Border Star 85 data, Archaic assemblages appear to reflect later stages of reduction and/or a less expedient technology which incorporates a wider variety of material types and the production of smaller debitage.

The sample of space and prehistoric activities represented by the Test Track data is too small to allow for comparisons of locational patterns or variations in the tool variety/assemblage size relationships documented by the Border Star 85 and GBFEL-TIE projects. Some of the Test Track sites appear to contain relatively few tool types, suggesting logistical or function-specific activities. Some, however, have surprisingly high artifact variety, such as LA 67589. This site contains the largest assemblage documented on the Test Track survey (53 artifacts) and contains 10 different artifact types (excluding debitage). Although, due to differences in survey methodologies, a direct comparison is not feasible, such variety seems high, even for an assemblage of 53 items.

The high artifact variety and relatively low hearth count at LA 67589 (Provenience 1) stands in contrast to two other dune sites: LA 67587 and LA 67588. At the latter sites, artifact variety and assemblage size are limited, but the number of fossil hearths is considerably higher. Differences in the nature of activities represented is an obvious suggestion. (This difference may even be evident at LA 67589, between Proveniences 1 and 2; in Provenience 2, numerous hearths are present but the artifact assemblage is more limited than in Provenience 1 where hearths are present but fewer in number.)

In any event, a range of occupational configurations is probably represented at the Test Track sites. Short-term occupations resulting from limited foraging/extraction activities, as well as probable residential occupations appear to be represented, at least for the Late Archaic period. Interestingly, none of the Formative sites encountered is as extensive in terms of lithic assemblage compo-

sition, number of hearths, or spatial extent as the Lithic Unknown and Late Archaic sites recorded. This fact may further support the tentative evidence of a difference between the two cultures' uses of the area. Conversely, Eidenbach and Wimberly's analysis of Archaic and Formative sites found in the parabolic dune margins suggested that little difference existed between the two groups' use of the area. This apparent contradiction warrants further study.

Area-specific Research Issues

The paramount issue which recent research in the Border Star 85 and GBFEL-TIE project areas has identified is that prehistoric use of the Tularosa Basin floor was probably more extensive and complex than previous researchers have acknowledged. The presence of apparent residential locations, along with an archeological record which is far more extensive than previously recognized indicates that earlier reconstructions of subsistence and settlement require revision (Anschuetz 1988d; Doleman 1988c; Chapman and Doleman 1988; Seaman 1986b). The principal research potential of the cultural resources documented on the Test Track impact area survey lies in their potential contribution to a better understanding of basin floor use. The sites in the Test Track impact area exhibit interesting similarities to, and differences from cultural remains documented elsewhere on the Tularosa Basin floor.

Specific research questions raised by the Test Track survey include the following:

(1) Why do Test Track impact area assemblages lack ground stone?

(2) Why are prehistoric cultural remains essentially absent from the upland flats, and what role do geomorphic processes play in the visibility of cultural materials in that zone?

(3) What kinds of activities are represented at the Test Track sites? What aspects of the local environment drew prehistoric peoples to the area?

(4) How many of the recorded "possible" fossil hearths are, in fact, relict features? How can these features be used to address the above questions (potential for archeomagnetic, archeobotanical, radiocarbon studies)?

(5) What behavioral or organizational differences are responsible for the differences in lithic assemblages, both between different periods, and between the Test Track area and the Border Star 85 and GBFEL-TIE?

(6) Why are ceramics so rare in the Test Track impact area, even at ceramic sites?

(7) Do the differences between Lithic Unknown site assemblages and those at Late Archaic and Formative sites represent functional differences? What time period(s) do Lithic Unknown sites actually represent?

(8) What subsistence patterns and what forms of technological organization are present in the Test Track impact area, and what are the larger implications of this for prehistoric use of the Tularosa Basin floor?

Although limited, the Test Track cultural resources have significant research potential for understanding these questions. Laboratory analysis of lithic assemblages, dating and analysis of hearths, and environmental studies--especially an assessment of the geomorphic factors affecting the area's cultural resources visibility and integrity should form the core of a well-designed research program in the Test Track impact area.

Potential Impacts

Three sources of potential impact to the cultural resources in the Test Track impact area exist. These are (a) ongoing Test Track Facility missions, (b) natural erosional processes, and (c) future construction and vehicle traffic in the Test Track impact area. Although wind and water erosion have undoubtedly been a factor ever since the original deposition of cultural materials in the area, it is entirely possible that most of the erosion responsible for the exposed and eroded cultural resources recorded during the survey has taken place during the recent cycle which began some 100-150 years ago (Blair et al, 1988, Doleman 1988b). If this is the case, and the present cycle continues, then the archeological record of the Test Track impact area may be in the process of relatively rapid degradation. A geomorphological assessment of the area would provide valuable baseline data for better understanding the geomorphic context of the area's cultural resources. Currently, most are eroding but appear to have varying levels of intact remains present also.

Although no construction is known to be planned for the impact area, the centerline has been recently surveyed and staked, and the repeated vehicle traffic has broken down the surface-stabilizing cryptogamic cover. The result is that the extremely fine gypsum sands (flour-like in consistency) are becoming subject to erosion, and are impassable without four-wheel drive vehicles. Other traffic in the Test Track impact area is less focused and thus has a

lesser impact on the surface. The parabolic dunes are essentially impassable, and receive little traffic, but vehicles are regularly used following certain Test Track missions to search the uplands area for ejecta. Continuation of this traffic may result in degradation of the uplands surface. Although cultural resources are rare in this zone, given the possibility that archeological materials are simply buried and not visible, some care should be exercised.

The principal sources of potential damage to cultural resources in the Test Track impact area are on-going Test Track missions. As noted in Chapter 1, rocket sleds mounted on the track are used by several branches of the military to test ejection systems, weapons delivery systems, and the effects of high speeds and impacts on a variety of hardware. These experiments generally involve the rocket sleds' speeding down the track towards the impact area at speeds of up to Mach 8 (over 6,000 mph; most missions involve lesser speeds, e.g. Mach 1-2, 700-1500 mph).

When the sleds leave the end of the track on the south side of Allen Draw (see Figure 2.1), they cross the draw in the air and impact on a man-made dune on the north side of the draw ca. 1700 ft. away. The great speeds involved result in the total destruction of the rocket and sled and the ejection of large and small pieces of debris across much of the impact area. Occasionally, barriers are erected at the end of the track for impact studies, and these tests may spread debris across a wider area. When delivery systems are being tested, mock weapons are dispensed from the sled just prior to impact and spread across the impact area in attempts to achieve certain patterns. One test of this sort was conducted during the field work, and items were seen impacting in a widening band along the centerline which continued north outside the impact area. Several impacts were noted in the parabolic dunes zone in the western half of the impact area.

Finally, the Holloman AFB Explosive Ordnance Disposal unit uses the area just north of the end of the Test Track to explosively destroy unusable rocket motors. These activities result in metal fragments and unburned rocket fuel being dispersed across the southern portions of the impact area.

Field observations made during the survey indicate that most of the impacts are from small pieces of metal which create small holes in the ground surface. The majority of holes are less than 50 cm in diameter and 20 cm deep. Larger items are not uncommon, however, and most of an entire rocket motor was found in the parabolic dunes in the northwestern portion of the survey area ca. 2 km from the end of the Test Track (Plate 6.1). The impact hole associated with this object was not found, but had probably been obscured by vegetation regrowth. Numerous other large metal objects, weighing hundreds of pounds were noted during the survey throughout the impact area.

The nature of the impact holes is a function of both the size of the impacting debris, and the angle of impact. Debris resulting from sled impacts into the man-made dune and from explosive destruction of ordnance and rocket motors probably yields higher impact angles, while mock weapons dispensing results in lower angles. Low-angle impacts often consist of multiple "skips", each less severe than the last. Plate 6.2 shows the results of a low-angle mock weapon impact and the accompanying skips. Plate 6.3 show the result of a large low-angle impact and a piece of twisted metal found nearby which may have created the hole. The largest hole found in the area was located in the west-central portion of the impact area and was circular, ca. 2m (6 ft.) across, and 1 m (3 ft.) deep, and was surrounded by metal fragments.

Unlike most cases, in which the potential impacts of planned earth-disturbing activities on specific cultural resources can be easily assessed, the locations of impacts resulting from Test Track activities are more or less random. No site documented during the survey exhibited evidence of extensive disturbance due to debris impacts. One site, however, LA 67591, is littered with Test Track debris and rocket fuel, and is obviously in danger. The overall density of Test Track debris is, not surprisingly, greatest in the south and near the centerline. Thus cultural resources located in the south-central part of the impact area--such as LA 67591--are in greatest danger. Nonetheless, the ubiquity of debris in the area indicates that impacts occur throughout the area.

Probably the best means of assessing potential impacts on the Test Track impact area cultural resources is a probabilistic one in which sites are ranked in terms of distance and bearing from the Test Track centerline. This information has been made available to the Albuquerque CE as a part of the Data Compendium. The specific recommendations provided below assume that all cultural resources in the Test Track impact area are in some danger, from erosion, Test Track-related activities, or both.

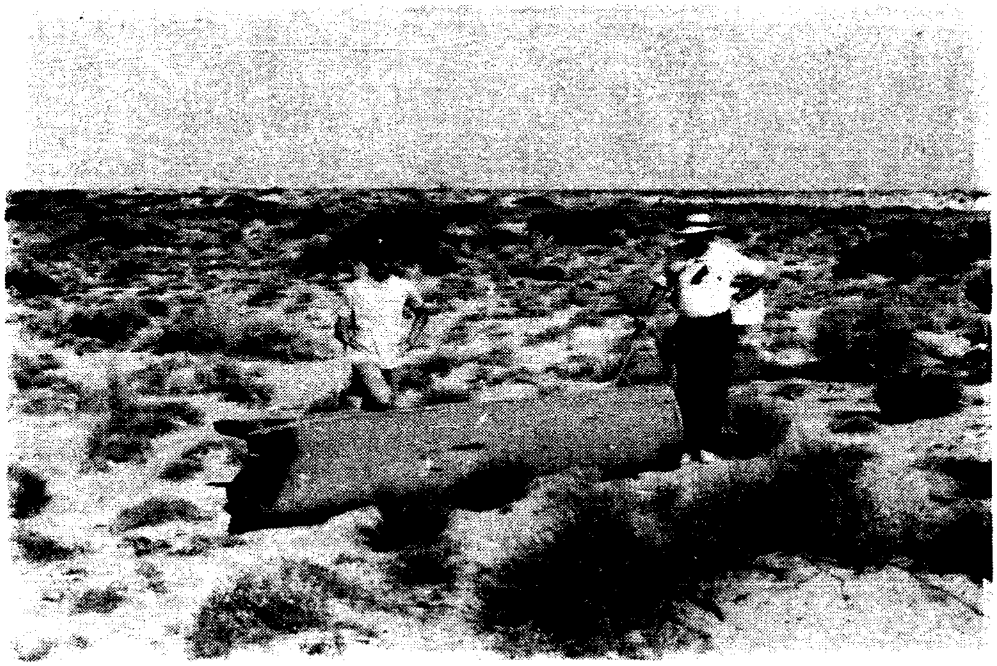


Plate 6.1. Old rocket motor in northwest part of survey area

Plate 6.2. Typical low angle impact from recent test (note "skips", view north)

Plate 6.3. Impact hole (north/northwest of Track end) with large metal fragment found 5 m away

Specific Recommendations

Prehistoric and Historic Isolated Manifestations

Of the prehistoric and historic isolated manifestations recorded during the Test Track impact area survey only the isolated prehistoric fossil hearths require further documentation or analysis. The two diagnostic artifacts encountered--one Late Archaic projectile point (Isolate No. 27) and a pre-1920s soda pop bottle (Isolate No. 32) were collected and will be permanently curated by the White Sands Missile Range Environmental Division (both were found on WSMR property). The remaining prehistoric and historic isolated artifacts have received adequate documentation, as have those isolated features consisting solely of fire-cracked rock fragments.

The nine documented possible and definite fossil hearths (or hearth scatters) should be revisited and tests should be conducted to determine which are in fact hearths. Those fossil hearths which can be confirmed and which contain dateable and/or archeobotanical materials, or have associated artifact assemblages offer significant research potential, and may represent an important, albeit ephemeral, aspect of the prehistoric use of the area. Certain of these features may be eligible for nomination to the National Register of Historic Places (NRHP) under Criterion "d" of 36 CFR Part 60.4, but specific significance recommendations cannot be made until testing of these features is complete.

The possible hearth isolates are Isolate Nos. 36 (1), 38 (several), 40 (several, ceramics), 42 (1), 43 (5), 46 (4), and 53. Of these, Isolate Nos. 38, 40, 43, and 46 probably offer the greatest potential.

The definite fossil isolated hearths consist of Isolate Nos. 33, 39, 48, and 55, each containing one hearth. These features should be revisited, collected, dated (if possible), and analyzed. Isolate Nos. 39, 48, and 55 offer the greatest potential. Isolate No. 48 should be revisited and fully excavated in order to determine its age, and the possibility of buried cultural remains in upland flats deposits.

Prehistoric Sites

For the following site-specific discussion, refer to Table 6.1 and the site descriptions in Chapter 5 for more detailed site data.

<u>LA 67585 (OCA:366-1)</u>

Estimated age: Lithic Unknown

LA 67585 occupies a rather unique location in the project area. The site appears to have experienced considerable erosion, and the potential for buried materials is low. Shallow, mixed, subsurface materials are probable in the blowouts, and it is possible that some buried remains may exist in the deeper deposits at the north end of Provenience 2. This area should be tested to evaluate this question. Although eroded, the site's lithic assemblage is nonetheless significant as a source of functional data. Testing and screened stripping of the blowout deposits would suffice to recover this information.

Because the research potential of LA 67585 was not exhausted by survey recording, it is considered eligible for nomination to the NRHP under Criterion "d" of 36 CFR Part 60.4.

LA 67585 is located far from the Test Track and appears to be in little danger at this time.

<u>LA 67587 (OCA:366-3)</u>

Estimated age: Lithic Unknown

Most of LA 67587 appears eroded, shallow, and, given the paucity of artifacts, quite ephemeral. The numerous possible fossil hearths in Provenience 2, however, if real, suggest substantial occupation. Shallow, mixed artifactual materials are probable in Provenience 1, and possible in Provenience 2. Buried, intact deposits are possible in the Provenience 2 dune. This possibility should be tested. The lithic assemblage, though small may contain valuable functional information. Screened stripping of the deposits in both proveniences would recover any lithic data and would help confirm the site's extent.

The site is located in the parabolic dunes and is in moderate danger compared to other sites in the survey. The site's real significance lies in the possibility that the numerous possible fossil hearths may reflect substantial redundant occupation.

Without the results of testing for subsurface deposits and to confirm the nature of the fossil hearths at LA 67587, NRHP eligibility is difficult to determine. Because the site's nature is uncertain, it must be considered eligible for nomination to the NRHP under Criterion "d" of 36 CFR Part 60.4.

LA 67588 (OCA:366-4)

Estimated age: Late Archaic

This site is similar to LA 67587 in that it contains few artifacts but numerous fossil hearths. Buried remains are probable. Shallow, mixed deposits are probable in Provenience 1, while similar deposits may be present in Provenience 2 along with deeper materials. These possibilities require further evaluation.

LA 67588 is the best example of the large parabolic dune setting, and generally offers greater research potential than its neighbor to the north, LA 67587. Data from both, however, should be acquired for comparative purposes, with the greater investment being made at LA 67588. The site's significance and research potential lie in its dune setting and in the presence of dateable hearths with archeobotanical remains and the potential it offers for evaluating the fossil hearth "terrace" hypothesis.

Both Provenience 1 and 2 should be tested for buried materials with screening of excavated materials. Extensive screened surface-stripping may be warranted for collection of lithic assemblage data. Feature 1 warrants collection and analysis. Other hearths should be analyzed for the purpose of evaluating the hypothesis that fossil hearth "terraces" are present. Surface collection and systematic stripping/screening (sample) should be performed.

The location of LA 67588 is similar to LA 67587, and the site is in moderate danger compared with other sites.

Based on the the site's location, and the presence of datable hearths, LA 67588 is considered eligible for nomination to the NRHP under Criterion "d" of 36 CFR Part 60.4.

LA 67589 (OCA:366-5)

Estimated age: Late Archaic

LA 67589 is the most complex and diverse prehistoric site recorded on the Test Track survey. Several at least partially intact features are present in both proveniences, and have the potential to yield dates and archeobotanical remains. In addition, both proveniences contain diverse lithic assemblages (material and type diversity) and the potential for buried intact features and assemblages. Differences in lithic assemblage attributes and fossil hearth counts suggest the possibility that the two proveniences are functionally distinct.

LA 67589 contains the largest and most diverse lithic assemblage documented in the Test Track survey. Although the site lies far from the Test Track, data collected from it would be invaluable in understanding the Late Archaic component of the cultural resources in the Test Track impact area. The site should be tested and dated at the least. The site also offers considerable potential for excavation, since buried, intact remains, as well as shallow deposits in the blowouts are probably present.

The artifact assemblage at LA 67589, together with the presence of numerous datable features, and two possibly distinct occupations and/or functional components indicate significant research potential. The site is considered eligible for nomination to the NRHP under Criterion "d" of 36 CFR Part 60.4.

LA 67591 (OCA:366-7)

Estimated Age: Late Archaic

LA 67591 is a Late Archaic site with a possible Lithic Unknown component. Three proveniences are present, and the two major ones (1 and 2) may be functionally distinct). The site is the only Archaic site located on an isolate dune remnant in the upland flats. It is also located near a possible "playa" or ephemeral pond.

The site probably has subsurface materials in addition to datable features with archeobotanical remains. The site's unique environmental location as well as the potential for investigating questions concerning geomorphic processes in the upland flats zone give it particular significance. The LA 67591 lithic assemblage also exhibits fair to high diversity, suggesting more than an ephemeral occupation.

LA 67591 appears only moderately eroded, but the site is littered with Test Track debris including metal pieces and fragments of rocket fuel. The site lies approximately 700 m N of the end of the Test Track only a few degrees off of the track orientation. It is also located approximately 200 m from the impact dune/rocket motor disposal area on the north side of Allen Draw. As such, LA 67591 is the nearest of all the recorded sites to the Test Track, and is subject to considerable potential impacts from on-going Test Track activities.

The site may require data recovery activities as there is no viable avoidance option and no way to protect it. Proveniences 1 and 2 should be tested for depth, stripped, and screened. All features should be excavated. The site's

lithic assemblage may be more extensive than surface evidence indicates, depending on the possibility of buried materials in Provenience 2.

LA 67591 is unique in several respects, including location, geomorphic context, and lithic assemblage, and is considered eligible for nomination to the NRHP under Criterion "d" of 36 CFR Part 60.4.

LA 67592 (OCA:366-8)

Estimated age: Late Formative

LA 67592 is one of only two ceramic sites in the Test Track survey area and also exhibits a fairly diverse lithic assemblage, as well as dateable features with archeobotanical materials. Feature 2 is one of the largest charcoal/ash features noted on the survey. The site is limited in extent, but nonetheless has significant research potential. The greater overall degree of lichen-stabilization of the site deposits may indicate the presence of extensive buried, possibly intact remains.

The site lies in the parabolic dunes in an area known to receive debris impacts from Test Track missions, and is in moderate-to-high danger compared with other sites in the survey.

The presence of ceramics and dateable features at LA 67592, together with the site's location with respect to the other ceramic site (LA 67593) indicate significant research potential and the site is considered eligible for nomination to the NRHP under Criterion "d" of 36 CFR Part 60.4.

LA 67593 OCA:366-9)

Estimated age: (Late?) Formative

LA 67593 represents the other of only two ceramic sites documented in the impact area and contains at least one dateable feature with probable archeobotanical remains, and a fairly diverse lithic assemblage. The site's significance lies in this and its unique location on the leeward crest of a parabolic dune in fairly stable deposits. The high degree of lichen-stabilization may indicate a greater degree of preservation at the site.

LA 67593 is a small site which may contain valuable lithic, ceramic, and other archeological data relevant to understanding Formative adaptations in the Test Track impact area. The site's deposits should be tested. Stripping (with screening) should be used to recover the probable buried artifactual remains. The site's one feature should be dated and analyzed.

Based on the location of LA 67593, as well as its diverse lithic assemblage, the site is considered eligible for nomination to the NRHP under Criterion "d" of 36 CFR Part 60.4.

LA 67594 (OCA:366-10)

Estimated age: Late Formative

LA 67594 was discovered during boundary reconnaissance, and only briefly recorded. The site's degree of preservation is remarkable, and the condition of the fossil hearths is generally better than at sites located within the survey area. The site is in the process of eroding from the dune, however, and the fossil hearths are being pedestaled and will eventually be destroyed.

The site's large lithic and ceramic assemblages, well-preserved hearths, and unique (for a ceramic site) location in an isolated dune remnant give it significant research potential.

Although LA 67594 is considered eligible for nomination to the NRHP under Criterion "d" of 36 CFR Part 60.4, it is located outside the Test Track impact area almost 90 degrees off the Test Track centerline and is in little danger from Test Track activities. Short of gathering more detailed data for comparative purposes, no treatment is required for the site.

Historic Sites

LA 67586 (OCA:366-2)

Estimated age: 1940-1950

The origin of the materials dumped at LA 67586 is uncertain. The site's archeological interest lies in its possible connection with the reported but unconfirmed military use of the Guilez Springs area to house refugee German scientists following World War II.

Archival research and interviews would suffice to determine any possible relation between the site and the reported housing of German scientists on White Sands Missile Range. Collection and analysis of diagnostic artifacts might also be required.

LA 67586 lies far from the end of the Test Track and is probably in little danger of significant impacts fr)m ongoing Test Track activities.

Because of the site's possible relationship to an interesting aspect of American history, LA 67586 may be eligible for nomination to the NRHP under Criterion "d" of 36 CFR Part 60.4. Further research is required to confirm the site's origin, however.

LA 67590 (OCA:366-6)

Estimated age: 1940-1950

LA 67590's interest and potential significance lie in its probable association with early post-war military activities on White Sands Missile Range. As in the case of LA 67586, the site contents may relate to the use of the Guilez Springs location for housing refugee German scientists. Archival research, interviews, and collection and analysis of diagnostic artifacts would serve to evaluate the origin of the site's contents.

LA 67590 lies far from the end of the Test Track and is probably in little danger of significant impacts from ongoing Test Track activities.

If LA 67590 is, in fact, related to postwar housing of German scientists at White Sands Missile Range, it may be eligible for nomination to the NRHP under Criterion "d" of 36 CFR Part 60.4 Further research, however is required to determine its origins.

Summary

The eight prehistoric and two pre-1950 historic sites recorded in the course of the Holloman High Speed Test Track survey, represent several different environmental contexts within the overall basin floor setting, as well as a diversity of site types, and temporal periods. With the exception of the White Sands National Monument reconnaissance of Eidenbach and Wimberly (1980), the Holloman Test Track impact area survey constitutes the first extensive archeological survey in the White Sands semi-stabilized dune periphery zone of the Tularosa Basin floor. The Test Track survey results confirm a significant association between archeological materials and the dune periphery, and also raise important questions concerning archeological visibility in the stable upland flats zone .cb which lies just east of the dunes.

Among the most interesting of the phenomena recorded during the survey are the burned gypsum *fossil hearths* documented at numerous locations. These features have been documented in only one other instance (Eidenbach and Wimberly 1980), and exhibit considerable archeological interest as well as research potential. One such hearth was found partially exposed on the north side of Allen Draw in a side arroyo cut, suggesting that such features may be buried elsewhere in the area. Many of these features clearly contain datable archeobotanical materials, while the certainty with which others have been identified remains to be evaluated.

In addition to those components designated *lithic unknown*, the two principal prehistoric periods represented appear to be the late Archaic, and the late Formative. Taking the small area surveyed into account, these patterns are essentially in keeping with data from other surveys in the Tularosa Basin. The absence of early-mid Archaic and early (Mesilla Phase) Formative materials may be simply a sampling problem.

Because the basin floor represents a poorly understood component of regional prehistoric adaptations, most or all of the prehistoric sites are considered eligible for nomination to the NRHP under Criterion "d" of 36 CFR Part 60.4. Testing at these sites should suffice to make final eligibility determinations, and, together with the survey results should provide the basis for developing a management plan for the prehistoric cultural remains in the Test Track impact area. Such a plan should take into consideration, not only the behavioral and cultural-temporal questions raised by previous research and in this report, but should attempt to address the important geomorphic concerns expressed herein.

The two pre-1950 historic sites recorded on the survey appear to reflect early military use of the area, and may be related to the early postwar housing of refugee German scientists on White Sands Missile Range. If confirmed, this relationship may render these sites eligible for nomination to the NRHP under Criterion "d" of 36 CFR Part 60.4, in which case, archival research and, possibly further in-field data recovery would be required.

Altogether, the cultural resources of the Test Track impact area, although not vast in number, are interesting, unique, and scientifically valuable.

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Appendix 1

Holloman Test Track Survey Forms and Coding Guidelines

HOLLOMAN TEST TRACK

Master Site Recording Form

Survey Unit ☐☐ Site# ☐☐-☐☐☐

mm dd

Date ☐☐ ☐☐ Recorder ☐☐☐

Site Condition ☐☐

Topographic Setting ☐☐ Vegetation ☐☐

Elevation ☐☐☐☐ feet UTM: 3☐☐☐☐☐ E

35☐☐☐☐☐ N

Components Present [?=possible; 1=confirmed]

Paleo	Archaic	Lithic Unknown	Mesilla	Dona Ana	El Paso	Ceramic Unknown	Historic
☐	☐	☐	☐	☐	☐	☐	☐

Site Dimensions (m) length ☐☐☐ Width ☐☐☐ Size Complete? Yes ☐ No ☐

Total Proveniences ☐☐ Total Samples ☐☐

Field Significance Evaluation (rate each factor on a 1-5 scale):

☐ Site Type ☐ Restoration Potential

☐ Artifacts ☐ Aesthetics

☐ Architecture/Features

Site Summary Field Significance (check one box):

☐ 1--Excellent/Unique

☐ 2--Good

☐ 3--Average

(over for narrative description)

HOLLOMAN TEST TRACK

Master Site Recording Form (cont.)

Narrative Site Description Site# ☐☐-☐☐☐

(use extra sheets if necessary)

Please deal with the following subjects in order:

1. Cultural/Temporal Components
2. Site/Prov Boundaries
3. Assemblage Characteristics
4. Site Condition/Integrity
5. Sources of disturbance
6. Local Topo/Veg Patterns
7. Descr of Sampling Procedures
8. Trowel testing?
9. BS-85 site associations?

continued? ☐

HOLLOMAN TEST TRACK

Page __ of __

Provenience Summary Form

Survey Unit ☐☐ Site# ☐☐-☐☐☐

Provenience# ☐☐☐

Provenience Dimensions

est. depth ☐☐☐ cm length ☐☐☐ m width ☐☐☐ m No. coll artifacts ☐☐

Samples		total number
Rare?	☐	☐
Flag?	☐	☐
Discrete?	☐	☐

Attribute Summary

(enter totaled counts from Prov Recording Form except for total fcr]

Artifact Scatters									Historic**	
lithic	ceramic	fcr	total fcr*	hearths/ stains	artifact conc's	pit strs	surf units	other prehist	strs	trash
☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

*[1=0-10; 2=11-30; 3=31-100; 4=101-500; 5=501-1000; 6=>1000]

**Non-Military

Components Present *

*[?=possible; 1=confirmed]

Paleo	Archaic	Lithic Unknown	Mesilla	Dona Ana	El Paso	Ceramic Unknown	Historic
☐	☐	☐	☐	☐	☐	☐	☐

Provenience# ☐☐☐

Provenience Dimensions

est. depth ☐☐☐ cm length ☐☐☐ m width ☐☐☐ m No. coll artifacts ☐☐

Samples		total number
Rare?	☐	☐
Flag?	☐	☐
Discrete?	☐	☐

Attribute Summary

(enter totaled counts from Prov Recording Form except for total fcr]

Artifact Scatters									Historic**	
lithic	ceramic	fcr	total fcr*	hearths/ stains	artifact conc's	pit strs	surf units	other prehist	strs	trash
☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

*[1=0-10; 2=11-30; 3=31-100; 4=101-500; 5=501-1000; 6=>1000]

**Non-Military

Components Present *

*[?=possible; 1=confirmed]

Paleo	Archaic	Lithic Unknown	Mesilla	Dona Ana	El Paso	Ceramic Unknown	Historic
☐	☐	☐	☐	☐	☐	☐	☐

HOLLOMAN TEST TRACK

SITE/PROVENIENCE SAMPLE INVENTORY FORM

SITE NO: OCA-366-______ RECORDER: ________ DATE: ____/____/____

PROV	FEAT	SAMPLE TYPE	ARTIFACT CLASS	PROV/SAMPLE DIMENSIONS	FLAGGING FRACTION	FLAG/ARTIFACT COUNT
				x	%	
				x	%	
				x	%	
				x	%	
				x	%	
				x	%	
				x	%	
				x	%	
				x	%	
				x	%	
				x	%	
				x	%	
				x	%	
				x	%	
				x	%	
				x	%	
				x	%	

USAGE NOTES: Sample Type: "F"=Discrete, "D"=Discrete, "R"=rare. Artifact Class: "L"=Lithics/ground stone, "C"=Ceramics, "FCR"=FCR, "O"=other. Dimensions: Prov LxW if Flag or Rare, sample LxW if Discrete. Flag Fraction: percent of artifacts flagged (50% if every other, 100% if all). Count: actual flag count; for Rare samples=number of rare artifacts inventoried on IO/Artifact Recording Form.

Site No.: OCA-366 ________
Name: ______________
Date: ______________

HOLLOMAN TEST TRACK
AUGER TEST RECORD FORM

		STRATUM	Q4	Q3A	Q3Bw	Q3Bk	Q2Btk	Q1	Comments, including occurrence of cultural debris
STUDY UNIT SHOVEL TEST	DISTANCE/ AZIMUTH	BEGIN m below surface	END mbs	END mbs	END mbs	END mbs	END mbs	END mbs	
1	Dist ______ Azim ______	0.00							
2	Dist ______ Azim ______	0.00							
3	Dist ______ Azim ______	0.00							
4	Dist ______ Azim ______	0.00							
5	Dist ______ Azim ______	0.00							
6	Dist ______ Azim ______	0.00							
7	Dist ______ Azim ______	0.00							
8	Dist ______ Azim ______	0.00							
9	Dist ______ Azim ______	0.00							
10	Dist ______ Azim ______	0.00							

HOLLOMAN TEST TRACK

FIELD SPECIMEN CATALOGUE

Site No. OCA-366______
Recorder: __________
Date: __/__/88

Site No.	FS No.	Prov.	SU	Feat.	North Grid/ Azimuth	East Grid/ Distance	Elevation mbs	Nat'l Strat	Arb. Level	Enter "1" if taken Flo	C14	Pol	Den
_ _ . _ _ _	_ _ _ _ _	_ _	_ _	_ _	_ _ _ _ . _ _	_ _ _ _ . _ _	_ _ _ . _ _	_ _ _	_ _ _	_	_	_	_
_ _ . _ _ _	_ _ _ _ _	_ _	_ _	_ _	_ _ _ _ . _ _	_ _ _ _ . _ _	_ _ _ . _ _	_ _ _	_ _ _	_	_	_	_
_ _ . _ _ _	_ _ _ _ _	_ _	_ _	_ _	_ _ _ _ . _ _	_ _ _ _ . _ _	_ _ _ . _ _	_ _ _	_ _ _	_	_	_	_
_ _ . _ _ _	_ _ _ _ _	_ _	_ _	_ _	_ _ _ _ . _ _	_ _ _ _ . _ _	_ _ _ . _ _	_ _ _	_ _ _	_	_	_	_
_ _ . _ _ _	_ _ _ _ _	_ _	_ _	_ _	_ _ _ _ . _ _	_ _ _ _ . _ _	_ _ _ . _ _	_ _ _	_ _ _	_	_	_	_
_ _ . _ _ _	_ _ _ _ _	_ _	_ _	_ _	_ _ _ _ . _ _	_ _ _ _ . _ _	_ _ _ . _ _	_ _ _	_ _ _	_	_	_	_
_ _ . _ _ _	_ _ _ _ _	_ _	_ _	_ _	_ _ _ _ . _ _	_ _ _ _ . _ _	_ _ _ . _ _	_ _ _	_ _ _	_	_	_	_
_ _ . _ _ _	_ _ _ _ _	_ _	_ _	_ _	_ _ _ _ . _ _	_ _ _ _ . _ _	_ _ _ . _ _	_ _ _	_ _ _	_	_	_	_
_ _ . _ _ _	_ _ _ _ _	_ _	_ _	_ _	_ _ _ _ . _ _	_ _ _ _ . _ _	_ _ _ . _ _	_ _ _	_ _ _	_	_	_	_
_ _ . _ _ _	_ _ _ _ _	_ _	_ _	_ _	_ _ _ _ . _ _	_ _ _ _ . _ _	_ _ _ . _ _	_ _ _	_ _ _	_	_	_	_
_ _ . _ _ _	_ _ _ _ _	_ _	_ _	_ _	_ _ _ _ . _ _	_ _ _ _ . _ _	_ _ _ . _ _	_ _ _	_ _ _	_	_	_	_
_ _ . _ _ _	_ _ _ _ _	_ _	_ _	_ _	_ _ _ _ . _ _	_ _ _ _ . _ _	_ _ _ . _ _	_ _ _	_ _ _	_	_	_	_
_ _ . _ _ _	_ _ _ _ _	_ _	_ _	_ _	_ _ _ _ . _ _	_ _ _ _ . _ _	_ _ _ . _ _	_ _ _	_ _ _	_	_	_	_
_ _ . _ _ _	_ _ _ _ _	_ _	_ _	_ _	_ _ _ _ . _ _	_ _ _ _ . _ _	_ _ _ . _ _	_ _ _	_ _ _	_	_	_	_
_ _ . _ _ _	_ _ _ _ _	_ _	_ _	_ _	_ _ _ _ . _ _	_ _ _ _ . _ _	_ _ _ . _ _	_ _ _	_ _ _	_	_	_	_
_ _ . _ _ _	_ _ _ _ _	_ _	_ _	_ _	_ _ _ _ . _ _	_ _ _ _ . _ _	_ _ _ . _ _	_ _ _	_ _ _	_	_	_	_
_ _ . _ _ _	_ _ _ _ _	_ _	_ _	_ _	_ _ _ _ . _ _	_ _ _ _ . _ _	_ _ _ . _ _	_ _ _	_ _ _	_	_	_	_
_ _ . _ _ _	_ _ _ _ _	_ _	_ _	_ _	_ _ _ _ . _ _	_ _ _ _ . _ _	_ _ _ . _ _	_ _ _	_ _ _	_	_	_	_

NEW MEXICO HISTORIC BUILDING INVENTORY FORM

building threatened? yes

surveyed date by

county

ID no.

field map number

UTM reference zone 12 13 easting northing

location description

city/town

land grant/reservation

building name

legal description tnsp____N S range____E W sec____ ____¼ ____¼

film roll by no.

negative nos.

loc. of neg. HPB

plan shape

PHOTO

3x5 or contact prints

date of construction

________estimate ________actual

source

use

present residential

other________________

historic residential

other________________

condition

___excellent ___good

___fair ___deteriorating

style

foundation material

wall material/surface

degree of remodeling

___minor ___moderate ___major

describe:

architectural features

surroundings

relationship to surroundings

___similar ___not similar

district potential

___yes ___no

significance

___eligible ___of interest ___none

if eligible, why?

comments

associated buildings? ___yes

what type?

if inventoried, list ID nos.

see back? ___yes

HOLLOMAN TEST TRACK PHOTOGRAPHY LOG

ROLL NO.: ____________ FILM: ____________________ Page ___ of ___

DATE	NEG. #	OCA SITE or IO #	SUBJECT	VIEW

HOLLOMAN TEST TRACK

IO / Artifact Recording Form

SITE ________ PROV ______ DATE ___ ___ RECORDER ______ SAMPLE TYPE ______

SAMPLE SIZE _____X_____ FLAG NO._____ FLAG RATIO ____:____ FLAGS SAMPLED _____

IO #	---CERAMICS---			---LITHICS---								---FCR---	
SMP TYP	Type	No.	Vs	Type	Cond	Matl	Cortx	Len	Wid	Th	Plt	Topo Type	Vg No

HOLLOMAN TEST TRACK

ISOLATED MANIFESTATION TOPOGRAPHY AND VEGETATION CODES
(Adapted from Laboratory of Anthropology, 1982)

TOPOGRAPHY: Use code that most nearly describes the local topography.

01	Arroyo/wash
02	Base of cliff
03	Bench
04	Blow-out
05	Canyon rim
06	Cave
07	Cliff/scarp/bluff
08	Constricted canyon
09	Dune
10	Flood plain/valley, bottom land
11	Hill top
12	Hill slope
13	Low rise
14	Mesa/butte
15	Mountain
16	Mountain front/foothill
17	Open canyon floor
18	Plain/flat
19	Playa
20	Ridge
21	Saddle
22	Base of talus slope
23	Talus slope
24	Terrace
25	Alluvial fan
26	Badlands
27	Lava flow (malpais)
98	Other
99	Unknown

SITE CONDITION

1 Intact

2 Wind eroded

3 Human disturbance

ECOLOGICAL ZONES: Use the code that most nearly describes the vegetation zone.

01	Forest
02	Woodland
03	Scrubland
04	Grassland
05	Desert scrub
06	Marshland
08	Other
09	Unknown

Reference: Laboratory of Anthropology
1982 Guidelines For Coding ARM Forms (Revised Edition). Archeological Records Management Project. Laboratory of Anthropology, Museum of New Mexico, Santa Fe.

REVISED 5/22/88

HOLLOMAN TEST TRACK

Lithic Data Codes

TYPE: Lithic Artifact Type

Debitage

01 - Angular Debris (can't distinguish ventral/dorsal surface)
02 - Flake (can distinguish ventral/dorsal)
03 - Bifacial Flake (biface thinning;curved,thin,prepared platform)
04 - Sharpening Flake (small, thin, may be pressure flake)
05 - Bipolar Flake

Cores

10 - Tested Rock (<3 flakes removed)
11 - Irregular Core
12 - Bifacial Core
13 - Blade/Unidirectional Core (single large platform)
14 - Blade/Bidirectional
15 - Tabular Blank (tested naturally occurring tabular form)
16 - Bipolar Core

Tools

20 - Hammerstone (cobble with battered & rounded surface)
21 - Pecking Stone (hammerstone w/ pronounced angular & sharp battering surface)
22 - Bifacial Cobble Tool/Chopper
23 - Retouched Angular Deb (ret scars >2mm, consistent pattern)
24 - Retouched Flake (ret scars >2mm, consistent pattern)
25 - Projectile Point
26 - Biface
27 - Uniface
28 - Scraper
29 - Drill
30 - Graver
31 - Spokeshave (retouched concavity)
32 - Unifacial Cobble Tool/Chopper
33 - Other
34 - Other

98 Manuport

99 Unknown

Groundstone

40 - Unknown (indeterminate fragment)
41 - Mano - Unknown (indet. mano frag)
42 - One-hand Mano
43 - Two-hand Mano
44 - Metate - Unknown
45 - Slab Metate (flat grinding surface)
46 - Basin Metate (concave grinding surface)
47 - Trough Metate
48 - Grooved Maul
49 - Grooved Axe
50 - Shaft straightener
51 - Other **

COND: Condition or completeness

1 - Unknown (all Ang Deb)
2 - Proximal
3 - Medial
4 - Distal
5 - Lateral
6 - Complete
7 - Used (cores only)
8 - Burned (cores and gs only)

MATL: Lithic Material Type (see attachment)

01 - Altered sedimentary
02 - Siltstones and Claystones
03 - Fossiliferous chert
04 - Pedernal Chert
05 - Jasper
06 - Chert
07 - Chalcedony
08 - Silicified Wood
09 - Silicified Wood - plated, poor quality
10 - Quartzite
11 - Quartzitic Sanstone
12 - Rhyolite - fine-grained
13 - Rhyolite - coarse-grained
14 - Other Igneous
15 - Andesite/Basalt
16 - Vesicular Basalt
17 - Obsidian

Matl: Lithic Material Type (continued)

18 - Granite
19 - Sandstone
20 - Carbonates/Limestone
21 - Schist
22 - Quartz Crystal   24 Caliche
23 - Turquoise
99 - Other **   25 Conglomerate

CORTEX

Percentage

0 = No cortex
1 = 1 – 10%
2 = 11 – 20%
3 = 21 – 30%
4 = 31 – 40%
5 = 41 – 50%
6 = 51 – 60%
7 = 61 – 70%
8 = 71 – 80%
9 = 81 – 90%
10 = 91 – 100%

Degree of Rounding

0 = No cortex
1 = Angular
2 = Subangular
3 = Rounded
4 = Unknown

PLT: Platform preparation

1 - Collapsed
2 - Cortical - 100% cortex on platform
3 - Single facet
4 - Multifacet
5 - Retouched
6 - Stepped - small step fractures on edge of platform
7 - Ground
8 - Ret/Grnd
9 - Step/Grnd
10 - Battered

** USE SPARINGLY: Always explain in narrative

Revised form 7/24

HOLLOMAN TEST TRACK

Material Stratification

Code	Grouped Material Type
01	**ALTERED SEDIMENTARY:** Hornfels, red, yellow, gray, altered mudstone. Grades to chert-like, grainy.
02	**SILTSTONES AND CLAYSTONES:** Claystone undifferentiated, and siltstones.
03	FOSSILIFEROUS CHERTS: Chert, mottled gray to black, tan to brown, often banded; usually with scattered minute hematite inclusions, also with fusilids, sponge spicules; fossiliferous. These material types were lumped due to the difficulty of distinguishing Permian cherts from the Jarilla and San Andreas Mountains.
04	PEDERNALES CHERT: Chert, chalcedony, clear to white black mossy inclusions, occasionally pink to orange.
05	JASPER: Chert, dark red, yellow, brown. Also includes Moss jaspers, chalcedony, clear colorless w/ abundant yellow or red mossy inclusions.
06	CHERT: Chert, cream to white, opaque, olive green to brown, light tan to buff; black chert, etc.
07	CHALCEDONY: Chalcedony
08	SILICIFIED WOOD: Silicified wood, undiffertiated, dark colors, waxy to dull; palmwood.
09	SILICIFIED WOOD: Plated, poor quality.
10	QUARTZITE: Quartzite, undifferentiated; range of colors.
11	QUARTZITIC SANDSTONE: Quartzitic sandstone, undifferentiated, dark gray to black, fine-grained light brown.
12	RHYOLITE: FINE-GRAINED:
13	RHYOLITE: COARSE-GRAINED:
14	OTHER IGNEOUS: Volcanics that have been altered metamorphically, and felsophyre, felsic; or fine-grained aplite undifferentiated.
15	ANDESITE/BASALT: Andesite or basalt, black, brownish gray, red-gray, bluish gray, undifferentiated.
16	VESICULAR BASALT: Red-gray, black brownish gray.

17 OBSIDIAN: Obsidian, undifferentiated.

18 GRANITE: Granite, undifferentiatyed.

19 SANDSTONE: Sandstone, fine-grained, medium-grained, and coarse grained.

20 LIMESTONE: Limestone, undifferentiated.

21 SCHIST

22 QUARTZ CRYSTALS

23 TURQUOISE

99 OTHER

HOLLOMAN TEST TRACK

CERAMIC TYPE CODES

Note: The asterisk indicates nonspecific, incomplete pottery type designations (see Figures 3, 4 and 5). Use these codes only if you are not certain of a more specific type identification. If a sherd is truly an unknown ware, then use code "99". Please describe all El Paso Brown rim sherds in the narrative section of the Master Site Form.

00*	Brownware
01*	Brownware, "popcorn" temper
02*	Unpainted Brownware, "popcorn" temper
03	Unspecific El Paso Brown [body sherds only]
04	El Paso Plain Brown [rim sherds only] (note rim profile)
05*	Painted Brownware, "popcorn" temper
06	El Paso Bichrome (note rim profile)
07	El Paso Polychrome (note rim profile)
08*	Brownware, fine-medium temper
09*	Unpainted Brownware, fine-medium temper
10*	Unpainted Brownware, fine-medium temper, corrugated
11	Smudged, corrugated "Other Brown"
12	Corrugated "Other Brown"
13	Textured "Other Brown"
14	Plain "Other Brown"
15	Mogollon Red-on-brown
20*	Whitewares
21*	Whiteware, mineral paint
22*	Whiteware, mineral paint, crushed rock with sand temper
23	Three Circle Red-on-white
24	Mimbres Polychrome
25*	Whiteware, black mineral paint, crushed rock with sand temper
26	Mimbres Boldface Black-on-white (Style I)
27*	Whiteware, black mineral paint-thin lines-crushed rock with sand temper
28	Mimbres Transitional Black-on-white (Style II)
29	Mimbres Classic Black-on-white (Style III)
30	Mimbres Black-on-white --"truly" indeterminate
31*	Whiteware, mineral paint, fine grain igneous temper
32	Socorro Black-on-white
33	Chupadero Black-on-white
34	Cibola Whiteware
35	San Marcial Black-on-white
36*	Whiteware, carbon paint
37	Gila Polychrome
38	Magdalena Black-on-white (looks like Galisteo Black-on-white)
40*	Redwares
41*	Plain Redware
42	San Francisco Red
43	Plain "other" Red
44	Playas Red
45*	Painted Redware
46*	Painted Redware, black matte
47	Lincoln Black-on-red
48	White Mountain Redwares
49*	Painted Redware, black glaze
50	Rio Grande Glazewares
60*	Terracottawares
61	Red on Terracotta Wares
75	Tucson Polychrome
80	Mexican Polychromes
85	Corrugated Graywares
86	Plain Graywares
99	Unknown

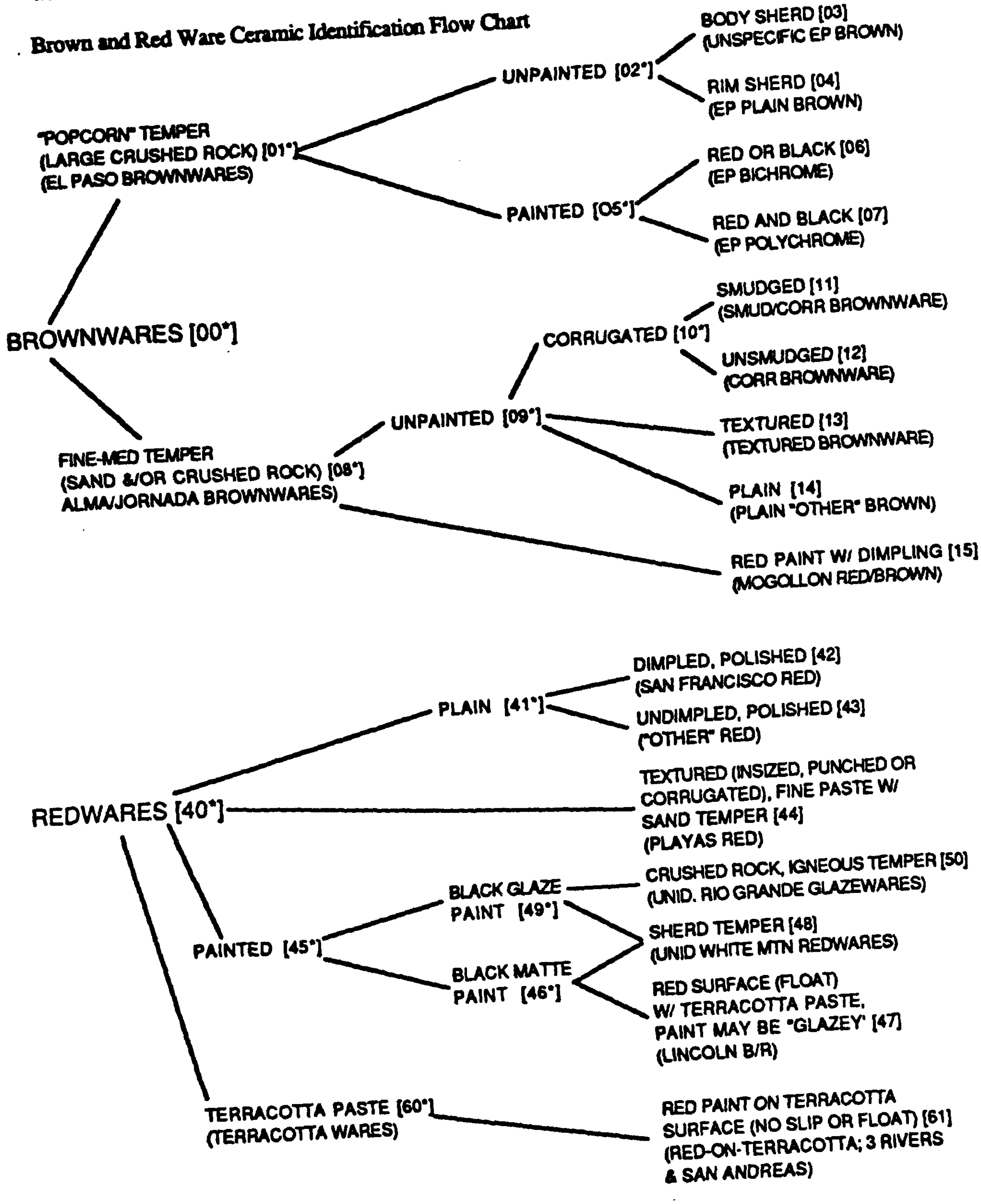
CERAMIC TYPE CODES
(continued)

<u>Vessel Codes</u>

00	Unknown
01	Bowl
02	Jars
03	Olla
04	Canteen
50	Seed Jar

HOLLOMAN TEST TRACK

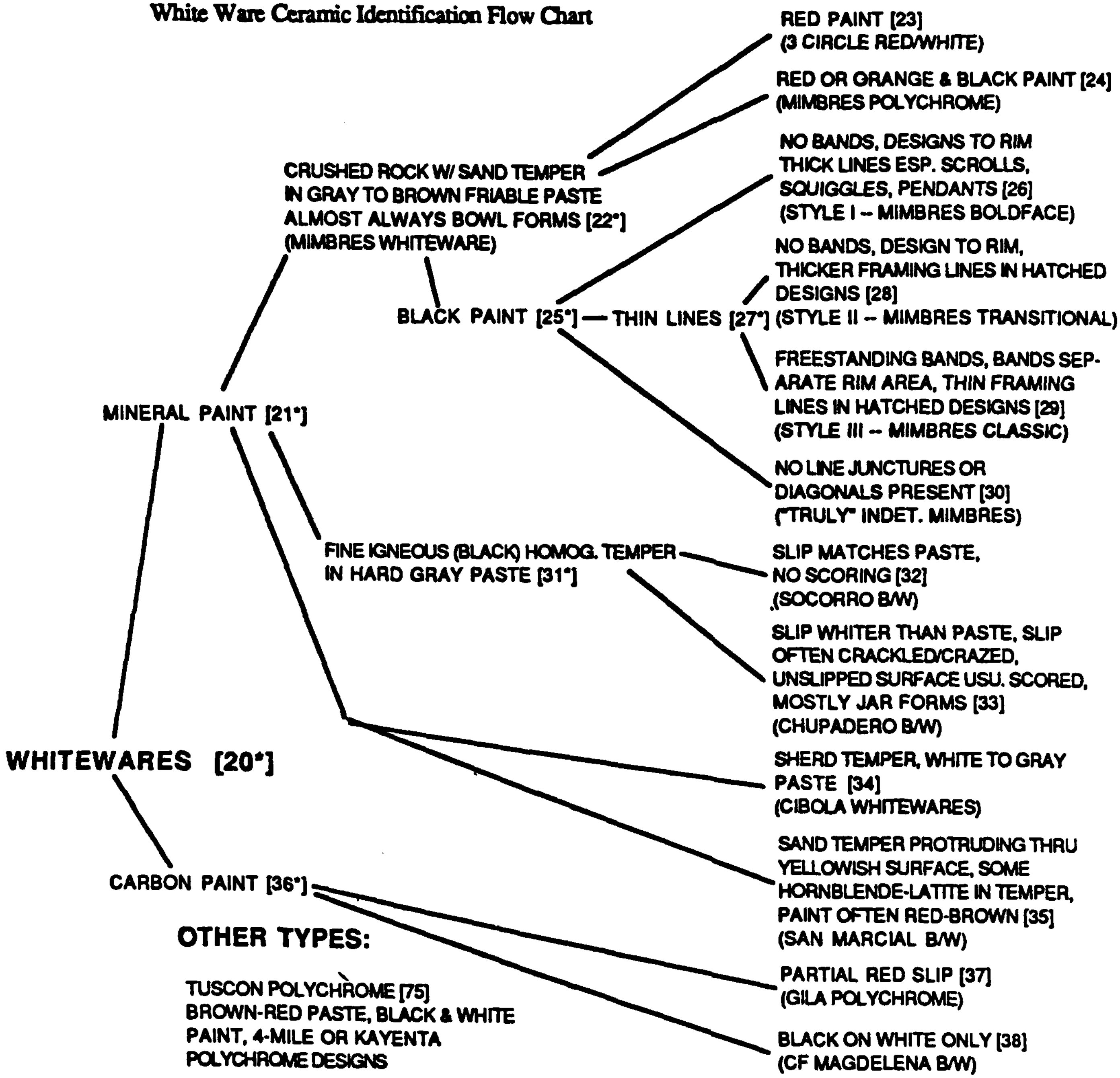
Brown and Red Ware Ceramic Identification Flow Chart



Key: * Unspecific ceramic type categories; use only when more specific types cannot be assigned.

HOLLOMAN TEST TRACK

White Ware Ceramic Identification Flow Chart



OTHER TYPES:

TUSCON POLYCHROME [75]
BROWN-RED PASTE, BLACK & WHITE PAINT, 4-MILE OR KAYENTA POLYCHROME DESIGNS

MEXICAN POLYCHROMES [80]
FINE PASTES SIMILAR TO PLAYAS RED, SAND TEMPER, WHITE OR RED SLIP, RAMOS POLY MOST COMMON (BLACK & RED NARROW LINES ON WHITE)

GRAYWARES (MOSTLY CIBOLA)
CORRUGATED [85] AND PLAIN [86]

UNKNOWN [99]

Key: * Unspecific ceramic type categories; use only when more specific types cannot be assigned.

HOLLOMAN TEST TRACK

Mimbres Design Motifs and Suggested Temporal Changes in Rim Form

Unspecified Brownwares ---"Popcorn" temper [code 03]

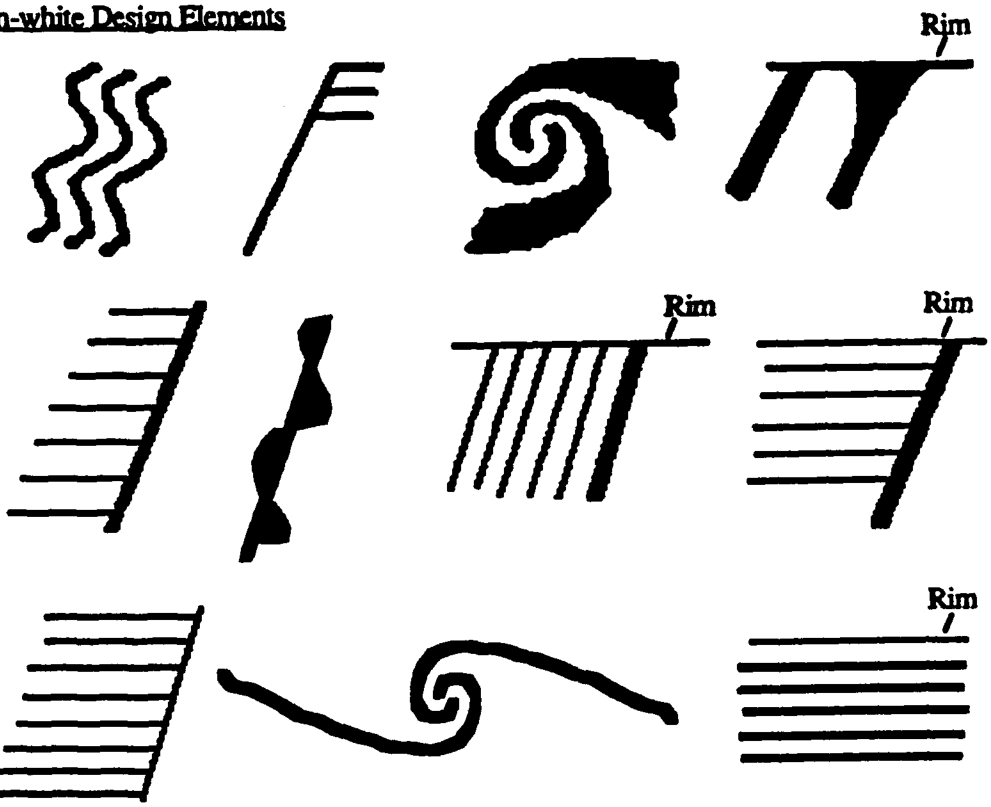
El Paso Brownware Series---Rims only, "popcorn" temper [code 04]
---Polychrome (black- and red-on-brown) [code 06]
---Bichrome (black-on-brown) [code 07]

Mimbres Black-on-white Design Elements

Style I
[code 26]

Style II
[code 28]

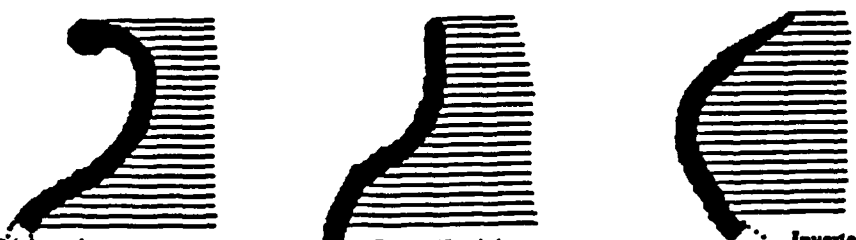
Style III
[code 29]



Mimbres Black-on-white-----Often misfired to black-on-red
-----No crackling
-----No scoring

Chupadero Black-on-white---Crackled and scored, gray slip [code 33]

El Paso Brownware Jar Rim Forms



Everted/Thickened
(Late El Paso Bichrome/Polychrome)
EL PASO PHASE

Direct/Straight
(Late El Paso Brown, Early Bichrome, Polychrome)
DONA ANA PHASE

Inverted/Pinched
(Early El Paso Brown)
MESILLA PHASE

HOLLOMAN TEST TRACK

FEATURE LIST

Feature Group	Feature Type
Artifact Scatter	Ceramic Ceramic scatter Clay quarry Groundstone Lithic Lithic quarry Lithic scatter Lithic/ceramic scatter
Hearth Features	Fire-cracked rock Hearth Mescal pit Ring midden Roasting pit Possible hearth Burned rock midden
Organic Remains	Bone Bone bead Macrofloral remains Shell
Caves/Rock Shelters	Caves Rock Shelters
Burials	Burials
Stone Circles/Tipi/Wikiups	Stone circles Tipi rings Wikiups
Fossil Bed	Fossil bed
Rock Art	Petrographs Pictographs

Feature List (continued)

Nonarchitectural Features	Agricultural field Bedrock mortar Bin/Cist Cache Cairn Garden plot Midden Well
Structural Features	Depression Field house House extant Isolated room/jacal Isolated room/masonry Kiva Mound Pithouse Pithouse village Possible adobe structure Possible jacal structure Possible masonry structure Possible subterranean structure Pueblo Roomblock - adobe Roomblock - jacal Roomblock - masonry Undefined rock alignment Wall
Historic Structural Features	Barn Church Dugout Fired brick structure House foundation Military installation Milled lumber structure Outhouse Ranch complex Shed Trading post Outbuildings Village/town

Feature List (continued)

Historic Nonstructural Features	Car body(s) Cemetary Corral Fence Graffiti Historical trash Kiln Mine Cattle tank Road/trail Tank Tent base Trailer Water catchment device Water control device Windmill Wood chips/cuttings Dump Metal Game pit

HOLLOMAN TEST TRACK

CREW CHIEF DAILY LOG

__/__/__88

Crew Chief: ________________________

Crew Members: ________________________

Other Personnel: ________________________

Survey Work Completed:

Survey Parcel: _____ Date Begun: __/__/88

Acreage covered: _____

No. Category I sites identified: ____, List: ________________________

No. Category II sites recorded: ____, List: ________________________

No. Isolated Manifiestations recorded: _____

Is all work in Survey Parcel completed? _____no _____yes

Survey Parcel: _____ Date Begun: __/__/88

Acreage covered: _____

No. Category I sites identified: ____, List: ________________________

No. Category II sites recorded: ____, List: ________________________

No. Isolated Manifiestations recorded: _____

Is all work in Survey Parcel completed? _____no _____yes

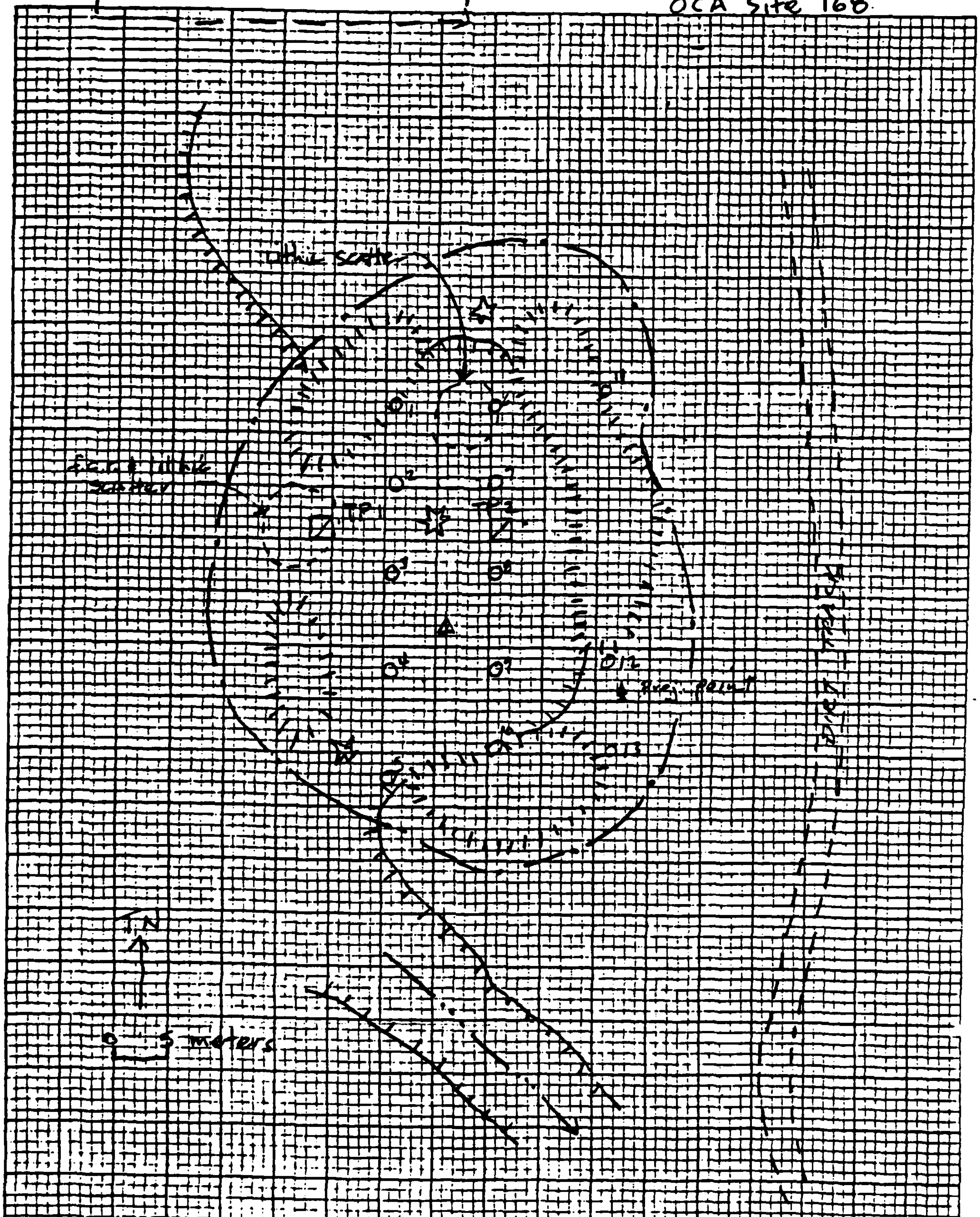
Testing Work Completed:

List Group I sites Tested: ________________________

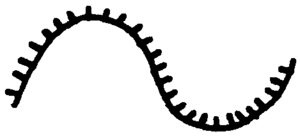
COMMENTS

SAMPLE FIELD SITE MAP

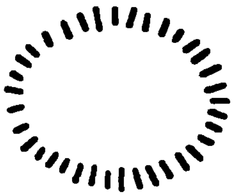
JOE X. TUTTLE
5/25/88
OCA Site 168



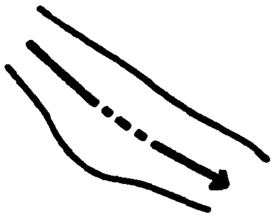
HOLLOMAN TEST TRACK | SURVEY SITE MAP KEY



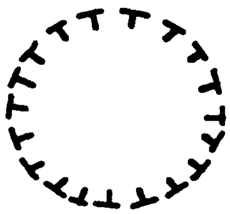
depression, blowout, downslope contour



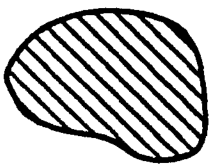
dune or mesquite coppice dune; can be used with the above line to help define a blowout or depression



drainage, arroyo, etc.; show sides of channel if incised



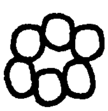
suspected pit or pit structure depression



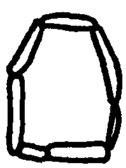
ash–stained area: reverse cross–hatch

"definite" hearth or roasting pit feature

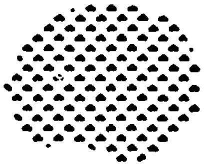
wall alignment



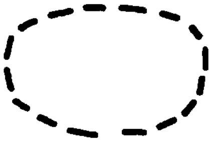
cobble–lined feature



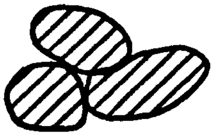
slab–lined feature



midden; use any kind of stipple pattern



use dashed line to bound artifact scatters; be sure to label or number the scatter

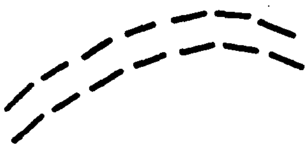


rocks, boulders, or outcrops; hatchure not necessary if labelled or keyed

dash – dot line for approximate site boundary

right–of–way, section line, powerline, or other unfenced political boundary line; label clearly

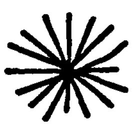
fenceline; label if right–of–way or section line



dirt road; use solid line or label for paved road

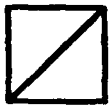
site cap/datum; label separately or use different symbol if USGS or other benchmark is recorded

yucca plant



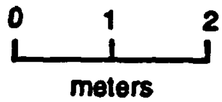
creosote bush

shovel–test pit with identifying number



shovel–scraped unit or area; draw to scale of map

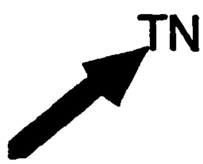
parallel lines to define transect



example of typical scale; try to use a scale which con–forms to grid of graph paper

symbols—left to right in order of use—for isolated or collected artifacts; key these on map as to artifact type and/or label with F.S. or I.O. number

symbol for projectile point/biface



north arrow your choice but label whether true or mag–netic north was used in mapping site

OCA Site 178
S.R.T.
5-25-88

site number, mapper's initials, and date

Appendix 2

Lithic Artifact Inventories by Site and Provenience

Holloman Test Track Survey Lithic Items by Site and Provenience

LA no.=67585 Field no.=1 Prov.=1

Artifact type	Material type	Condition	Cortex %	Platform type	Length	Width	Thick
Angular debris	Misc. chert	Unknown	None	N/A	21	17	8
Angular debris	Chalcedony	Unknown	None	N/A	10	17	9
Angular debris	Chalcedony	Unknown	20	N/A	10	12	13
Angular debris	Misc. chert	Unknown	None	N/A	26	13	13
Flake	Misc. chert	Complete	25	Cortical	19	24	7
Flake	Silt/claystone	Complete	55	Single facet	60	35	15
Flake	Misc. chert	Lateral	None	Single facet	25	10	6
Flake	Silt/claystone	Proximal	100	Single facet	31	30	9
Uniface	Silt/claystone	Unknown	None	N/A	35	41	22

Total = 9

LA no.=67585 Field no.=1 Prov.=2

Artifact type	Material type	Condition	Cortex %	Platform type	Length	Width	Thick
Angular debris	Quartzitic S-S	Unknown	None	Collapsed	23	13	10
Flake	Chalcedony	Complete	None	Ground	15	17	4
Flake	Chalcedony	Complete	55	Single facet	12	17	3
Flake	Silt/claystone	Lateral	None	Ground	22	21	7
Flake	Misc. chert	Complete	95	Cortical	30	18	18
Hammerstone	Silt/claystone	Complete	5	N/A	100	80	50

Total = 6

LA no.=67585 Field no.=1 Prov.=3

Artifact type	Material type	Condition	Cortex %	Platform type	Length	Width	Thick
Angular debris	Misc. chert	Unknown	None	Collapsed	20	15	7
Angular debris	Misc. chert	Unknown	None	N/A	12	16	3
Angular debris	Misc. chert	Unknown	None	N/A	21	18	5
Angular debris	Misc. chert	Unknown	None	N/A	10	19	4
Angular debris	Misc. chert	Unknown	None	N/A	10	17	3
Flake	Silt/claystone	Complete	None	Stepped	50	29	9

Total = 6

Holloman Test Track Survey Lithic Items by Site and Provenience

--- LA no.=67587 Field no.=3 Prov.=1 ---

Artifact type	Material type	Condition	Cortex %	Platform type	Length	Width	Thick
Flake	Chalcedony	Proximal	N/A	Collapsed	17	26	10
Flake	Chalcedony	Distal	N/A	N/A	11	21	9
Drill	Fossil chert	Distal	N/A	N/A	47	11	6

Total = 3

Holloman Test Track Survey Lithic Items by Site and Provenience

--- LA no.=67588 Field no.=4 Prov.=1 ---

Artifact type	Material type	Condition	Cortex %	Platform type	Length	Width	Thick
Angular debris	Misc. chert	Unknown	None	N/A	37	31	12
Angular debris	Quartzite	Unknown	None	N/A	22	14	4
Angular debris	Misc. chert	Unknown	None	N/A	38	11	5
Angular debris	Quartzite	Unknown	None	N/A	40	30	21
Angular debris	Quartzite	Unknown	None	N/A	42	39	35
Angular debris	Quartzite	Unknown	None	N/A	35	30	7
Flake	Limestone/carbonate	Complete	None	Single facet	41	35	12
Flake	Misc. chert	Lateral	None	Collapsed	36	16	3
Flake	Limestone/carbonate	Distal	None	Collapsed	12	24	5
Tested rock	Misc. chert	Unknown	80	N/A	35	31	21
Tested rock	Limestone/carbonate	Unknown	97	N/A	90	85	23
Core-irregular	Limestone/carbonate	Used	20	N/A	95	50	65
Spokeshave	Chalcedony	Complete	5	N/A	27	21	9

Total = 13

Holloman Test Track Survey Lithic Items by Site and Provenience

LA no.=67589 Field no.=5 Prov.=1

Artifact type	Material type	Condition	Cortex %	Platform type	Length	Width	Thick
Angular debris	Quartzite	Unknown	5	N/A	40	16	9
Angular debris	Feldspar	Unknown	None	N/A	19	10	6
Angular debris	Quartzitic S-S	Unknown	17	N/A	25	9	9
Angular debris	Misc. chert	Unknown	None	N/A	25	15	4
Angular debris	Feldspar	Unknown	None	N/A	10	12	9
Angular debris	Misc. chert	Unknown	None	N/A	19	20	15
Angular debris	Chalcedony	Unknown	19	N/A	23	13	6
Angular debris	Misc. chert	Unknown	None	N/A	20	14	6
Angular debris	Altered sed'y	Unknown	None	N/A	36	12	8
Angular debris	Altered sed'y	Unknown	60	N/A	35	15	12
Flake	Limestone/carbonate	Proximal	None	Single facet	21	18	14
Flake	Misc. chert	Complete	None	Single facet	17	14	5
Flake	Misc. chert	Complete	2	Collapsed	20	15	4
Flake	Misc. chert	Complete	None	Multi-facet	17	19	5
Flake	Misc. chert	Distal	None	N/A	4	12	2
Flake	Feldspar	Distal	None	N/A	13	23	5
Flake	Misc. chert	N/A	N/A	N/A	.	.	.
Flake	Pedernal chert	N/A	N/A	N/A	.	.	.
Flake	Misc. chert	N/A	N/A	N/A	.	.	.
Flake	Misc. chert	N/A	N/A	N/A	.	.	.
Flake	Quartzitic S-S	N/A	N/A	N/A	.	.	.
Flake	Misc. chert	N/A	N/A	N/A	.	.	.
Flake	Altered sed'y	N/A	N/A	N/A	.	.	.
Flake	Misc. chert	N/A	N/A	N/A	.	.	.
Flake	Misc. chert	N/A	N/A	N/A	.	.	.
Flake	Altered sed'y	N/A	N/A	N/A	.	.	.
Flake	Altered sed'y	N/A	N/A	N/A	.	.	.
Flake	Misc. chert	N/A	N/A	N/A	.	.	.
Flake	Misc. chert	N/A	N/A	N/A	.	.	.
Flake	Misc. chert	N/A	N/A	N/A	.	.	.
Core-irregular	Quartzitic S-S	Used	25	N/A	33	23	20
Core-irregular	Limestone/carbonate	Used	None	N/A	75	60	58
Core-irregular	Altered sed'y	Used	None	N/A	56	50	45
Core-irregular	Altered sed'y	Used	70	N/A	90	80	30
Hammerstone	Limestone/carbonate	N/A	N/A	N/A	.	.	.
Hammerstone	Quartzitic S-S	N/A	N/A	N/A	.	.	.
Retouched flk.	Misc. chert	Unknown	None	N/A	16	20	4
Proj. point	Pedernal chert	Lateral	None	N/A	46	25	9
Uniface	Misc. chert	Medial	None	N/A	30	34	11
Spokeshave	Misc. chert	Complete	None	Single facet	22	27	5
Unkn grndstone	Quartzitic S-S	Unknown	N/A	N/A	150	110	40

Total = 41

LA no.=67589 Field no.=5 Prov.=2

Artifact type	Material type	Condition	Cortex %	Platform type	Length	Width	Thick
Angular debris	Misc. chert	Unknown	None	N/A	5	8	2
Angular debris	Misc. chert	Unknown	20	N/A	30	29	14
Angular debris	Limestone/carbonate	Unknown	None	N/A	7	21	8
Flake	Limestone/carbonate	Lateral	None	Collapsed	30	42	6
Flake	Limestone/carbonate	Complete	None	Single facet	25	36	8
Flake	Misc. chert	Medial	None	Collapsed	10	12	4
Flake	Misc. chert	Distal	None	Collapsed	12	16	3
Flake	Quartzite	Complete	None	Single facet	16	22	5
Pecking stone	Jasper	Used	None	N/A	39	34	22
Ret. ang. deb.	Misc. chert	Unknown	None	N/A	23	15	12
Proj. point	Misc. chert	Complete	None	Single facet	37	20	6
Biface	Altered sed'y	Complete	None	N/A	55	31	13

Total = 12

Holloman Test Track Survey Lithic Items by Site and Provenience

LA no.=67591 Field no.=7 Prov.=1

Artifact type	Material type	Condition	Cortex %	Platform type	Length	Width	Thick
Angular debris	Misc. chert	Unknown	None	N/A	16	18	4
Flake	Misc. chert	Distal	None	N/A	11	14	2
Flake	Pedernal chert	Medial	None	N/A	21	31	6
Flake	Altered sed'y	Proximal	None	Single facet	32	31	7
Flake	Misc. chert	Proximal	None	Single facet	16	31	8

Total = 5

LA no.=67591 Field no.=7 Prov.=2

Artifact type	Material type	Condition	Cortex %	Platform type	Length	Width	Thick
Angular debris	Quartzite	Unknown	20	N/A	40	34	22
Angular debris	Quartzite	Unknown	None	N/A	21	8	3
Angular debris	Misc. chert	Unknown	None	N/A	15	22	7
Flake	Misc. chert	Complete	None	Single facet	13	12	2
Flake	Limestone/carbonate	Complete	None	Single facet	22	41	10
Flake	Chalcedony	Complete	None	Single facet	8	4	1
Flake	Chalcedony	Proximal	5	Cortical	13	11	2
Flake	Fossil chert	Complete	20	Single facet	25	32	6
Flake	Misc. chert	Complete	None	Single facet	8	9	4
Flake	Fossil chert	Medial	None	Single facet	16	22	3
Flake	Chalcedony	Complete	None	Single facet	16	17	5
Flake	Altered sed'y	Complete	100	Cortical	30	35	4
Core-irregular	Misc. chert	Used	None	N/A	35	23	23
Proj. point	Misc. chert	Complete	None	N/A	28	26	5
Biface	Fossil chert	Medial	None	N/A	20	17	4
Uniface	Limestone/carbonate	Lateral	None	N/A	42	42	15
Uniface	Misc. chert	Medial	None	N/A	17	15	4
Uniface	Misc. chert	Medial	20	Cortical	20	14	5
Uniface	Misc. chert	Lateral	None	Single facet	35	18	4

Total = 19

Holloman Test Track Survey Lithic Items by Site and Provenience

LA no.=67592 Field no.=8 Prov.=1

Artifact type	Material type	Condition	Cortex %	Platform type	Length	Width	Thick
Angular debris	Misc. chert	Unknown	20	N/A	45	32	20
Angular debris	Limestone/carbonate	Unknown	None	Collapsed	70	50	15
Angular debris	Quartzite	Unknown	None	N/A	16	26	7
Angular debris	Quartzite	Unknown	None	N/A	9	5	3
Angular debris	Schist	Unknown	None	N/A	48	26	7
Flake	Misc. chert	Distal	None	Collapsed	8	17	3
Flake	Quartzitic S-S	Complete	100	Cortical	35	30	15
Flake	Limestone/carbonate	Complete	None	Single facet	19	13	4
Flake	Limestone/carbonate	Complete	None	Single facet	22	13	4
Flake	Misc. chert	Proximal	None	Cortical	20	14	3
Flake	Misc. chert	Complete	None	Single facet	20	16	6
Flake	Limestone/carbonate	Complete	None	Single facet	19	25	18
Core-irregular	Altered sed'y	N/A	65	N/A	65	70	49
Core-irregular	Misc. chert	Used	15	N/A	91	70	75
Pecking stone	Quartzite	Used	30	N/A	61	71	35
Retouched flk.	Misc. chert	Complete	100	Multi-facet	55	58	18
Manuport	Silt/claystone	Complete	100	N/A	47	35	19
Manuport	Selenite	Unknown	None	N/A	39	11	1

Total = 18

LA no.=67592 Field no.=8 Prov.=2

Artifact type	Material type	Condition	Cortex %	Platform type	Length	Width	Thick
Angular debris	Quartzite	Unknown	None	N/A	19	22	7
Angular debris	Limestone/carbonate	Unknown	None	N/A	22	16	5
Angular debris	Limestone/carbonate	Unknown	None	N/A	46	37	15
Retouched flk.	Altered sed'y	Complete	None	N/A	59	31	6

Total = 4

Holloman Test Track Survey Lithic Items by Site and Provenience

LA no.=67593 Field no.=9 Prov.=1

Artifact type	Material type	Condition	Cortex %	Platform type	Length	Width	Thick
Angular debris	Limestone/carbonate	Unknown	None	N/A	50	49	20
Angular debris	Misc. chert	Unknown	None	N/A	31	20	9
Angular debris	Misc. chert	Unknown	None	N/A	21	7	4
Flake	Misc. chert	Proximal	None	Single facet	15	13	2
Flake	Limestone/carbonate	Complete	None	Multi-facet	45	31	10
Flake	Pedernal chert	Complete	None	Single facet	27	26	5
Core-irregular	Altered sed'y	Used	None	N/A	85	66	50
Uniface	Misc. chert	Lateral	None	N/A	65	42	7
Uniface	Limestone/carbonate	Unknown	None	N/A	45	49	20
Graver	Misc. chert	Proximal	None	Multi-facet	27	13	5

Total = 10

Appendix 3

Debitage Attributes by Site and Provenience

Holloman Survey: Debitage Attributes by Site

LA no.=67585 Field no.=1

Artifact type

TYPE	Frequency	Percent
Angular debris	10	52.6
Flake	9	47.4

Material type

MATL	Frequency	Percent
Silt/claystone	4	21.1
Misc. chert	10	52.6
Chalcedony	4	21.1
Quartzitic S-S	1	5.3

Cortex %

CORTEX	Frequency	Percent
None	13	68.4
20	1	5.3
25	1	5.3
55	2	10.5
95	1	5.3
100	1	5.3

Platform type

PLATFORM	Frequency	Percent
N/A	8	42.1
Collapsed	2	10.5
Cortical	2	10.5
Single facet	4	21.1
Stepped	1	5.3
Ground	2	10.5

Holloman Survey: Debitage Attributes by Site

--------------------------- LA no.=67587 Field no.=3 ---------------------------

Artifact type

TYPE	Frequency	Percent
Flake	2	100.0

Material type

MATL	Frequency	Percent
Chalcedony	2	100.0

Cortex %

CORTEX	Frequency	Percent

Frequency Missing = 2

Platform type

PLATFORM	Frequency	Percent
N/A	1	50.0
Collapsed	1	50.0

Holloman Survey: Debitage Attributes by Site

-------------------------- LA no.=67588 Field no.=4 --------------------------

Artifact type

TYPE	Frequency	Percent
Angular debris	6	66.7
Flake	3	33.3

Material type

MATL	Frequency	Percent
Misc. chert	3	33.3
Quartzite	4	44.4
Limestone/carbon	2	22.2

Cortex %

CORTEX	Frequency	Percent
None	9	100.0

Platform type

PLATFORM	Frequency	Percent
N/A	6	66.7
Collapsed	2	22.2
Single facet	1	11.1

Holloman Survey: Debitage Attributes by Site

---------------------------- LA no.=67589 Field no.=5 ----------------------------

Artifact type

TYPE	Frequency	Percent
Angular debris	13	34.2
Flake	25	65.8

Material type

MATL	Frequency	Percent
Altered sed'y	5	13.2
Pedernal chert	1	2.6
Misc. chert	20	52.6
Chalcedony	1	2.6
Quartzite	2	5.3
Quartzitic S-S	2	5.3
Limestone/carbon	4	10.5
Feldspar	3	7.9

Cortex %

CORTEX	Frequency	Percent
None	18	75.0
2	1	4.2
5	1	4.2
17	1	4.2
19	1	4.2
20	1	4.2
60	1	4.2

Frequency Missing = 14

Platform type

PLATFORM	Frequency	Percent
N/A	29	76.3
Collapsed	4	10.5
Single facet	4	10.5
Multi-facet	1	2.6

Holloman Survey: Debitage Attributes by Site

--------------------------- LA no.=67591 Field no.=7 ---------------------------

Artifact type

TYPE	Frequency	Percent
Angular debris	4	23.5
Flake	13	76.5

Material type

MATL	Frequency	Percent
Altered sed'y	2	11.8
Fossil chert	2	11.8
Pedernal chert	1	5.9
Misc. chert	6	35.3
Chalcedony	3	17.6
Quartzite	2	11.8
Limestone/carbon	1	5.9

Cortex %

CORTEX	Frequency	Percent
None	13	76.5
5	1	5.9
20	2	11.8
100	1	5.9

Platform type

PLATFORM	Frequency	Percent
N/A	6	35.3
Cortical	2	11.8
Single facet	9	52.9

Holloman Survey: Debitage Attributes by Site

LA no.=67592 Field no.=8

Artifact type

TYPE	Frequency	Percent
Angular debris	8	53.3
Flake	7	46.7

Material type

MATL	Frequency	Percent
Misc. chert	4	26.7
Quartzite	3	20.0
Quartzitic S-S	1	6.7
Limestone/carbon	6	40.0
Schist	1	6.7

Cortex %

CORTEX	Frequency	Percent
None	13	86.7
20	1	6.7
100	1	6.7

Platform type

PLATFORM	Frequency	Percent
N/A	7	46.7
Collapsed	2	13.3
Cortical	2	13.3
Single facet	4	26.7

Holloman Survey: Debitage Attributes by Site

------------------------- LA no.=67593 Field no.=9 -------------------------

Artifact type

TYPE	Frequency	Percent
Angular debris	3	50.0
Flake	3	50.0

Material type

MATL	Frequency	Percent
Pedernal chert	1	16.7
Misc. chert	3	50.0
Limestone/carbon	2	33.3

Cortex %

CORTEX	Frequency	Percent
None	6	100.0

Platform type

PLATFORM	Frequency	Percent
N/A	3	50.0
Single facet	2	33.3
Multi-facet	1	16.7

Holloman Survey: Debitage Attributes by Site

LA no.=67585 Field no.=1

TYPE	MATL	Frequency	Percent
Angular debris	Misc. chert	7	36.8
Angular debris	Chalcedony	2	10.5
Angular debris	Quartzitic S-S	1	5.3
Flake	Silt/claystone	4	21.1
Flake	Misc. chert	3	15.8
Flake	Chalcedony	2	10.5

CORTEX	MATL	Frequency	Percent
None	Silt/claystone	2	10.5
None	Misc. chert	8	42.1
None	Chalcedony	2	10.5
None	Quartzitic S-S	1	5.3
20	Chalcedony	1	5.3
25	Misc. chert	1	5.3
55	Silt/claystone	1	5.3
55	Chalcedony	1	5.3
95	Misc. chert	1	5.3
100	Silt/claystone	1	5.3

Holloman Survey: Debitage Attributes by Site

--------------------------- LA no.=67587 Field no.=3 ---------------------------

TYPE	MATL	Frequency	Percent
Flake	Chalcedony	2	100.0

For CORTEX*MATL
all data are missing since all the levels
of variable TYPE are missing.

Holloman Survey: Debitage Attributes by Site

LA no.=67588 Field no.=4

TYPE	MATL	Frequency	Percent
Angular debris	Misc. chert	2	22.2
Angular debris	Quartzite	4	44.4
Flake	Misc. chert	1	11.1
Flake	Limestone/carbon	2	22.2

CORTEX	MATL	Frequency	Percent
None	Misc. chert	3	33.3
None	Quartzite	4	44.4
None	Limestone/carbon	2	22.2

Holloman Survey: Debitage Attributes by Site

LA no.=67589 Field no.=5

TYPE	MATL	Frequency	Percent
Angular debris	Altered sed'y	2	5.3
Angular debris	Misc. chert	5	13.2
Angular debris	Chalcedony	1	2.6
Angular debris	Quartzite	1	2.6
Angular debris	Quartzitic S-S	1	2.6
Angular debris	Limestone/carbon	1	2.6
Angular debris	Feldspar	2	5.3
Flake	Altered sed'y	3	7.9
Flake	Pedernal chert	1	2.6
Flake	Misc. chert	15	39.5
Flake	Quartzite	1	2.6
Flake	Quartzitic S-S	1	2.6
Flake	Limestone/carbon	3	7.9
Flake	Feldspar	1	2.6

CORTEX	MATL	Frequency	Percent
None	Altered sed'y	1	4.2
None	Misc. chert	9	37.5
None	Quartzite	1	4.2
None	Limestone/carbon	4	16.7
None	Feldspar	3	12.5
2	Misc. chert	1	4.2
5	Quartzite	1	4.2
17	Quartzitic S-S	1	4.2
19	Chalcedony	1	4.2
20	Misc. chert	1	4.2
60	Altered sed'y	1	4.2

Frequency Missing = 14

Holloman Survey: Debitage Attributes by Site

LA no.=67591 Field no.=7

TYPE	MATL	Frequency	Percent
Angular debris	Misc. chert	2	11.8
Angular debris	Quartzite	2	11.8
Flake	Altered sed'y	2	11.8
Flake	Fossil chert	2	11.8
Flake	Pedernal chert	1	5.9
Flake	Misc. chert	4	23.5
Flake	Chalcedony	3	17.6
Flake	Limestone/carbon	1	5.9

CORTEX	MATL	Frequency	Percent
None	Altered sed'y	1	5.9
None	Fossil chert	1	5.9
None	Pedernal chert	1	5.9
None	Misc. chert	6	35.3
None	Chalcedony	2	11.8
None	Quartzite	1	5.9
None	Limestone/carbon	1	5.9
5	Chalcedony	1	5.9
20	Fossil chert	1	5.9
20	Quartzite	1	5.9
100	Altered sed'y	1	5.9

Holloman Survey: Debitage Attributes by Site

LA no.=67592 Field no.=8

TYPE	MATL	Frequency	Percent
Angular debris	Misc. chert	1	6.7
Angular debris	Quartzite	3	20.0
Angular debris	Limestone/carbon	3	20.0
Angular debris	Schist	1	6.7
Flake	Misc. chert	3	20.0
Flake	Quartzitic S-S	1	6.7
Flake	Limestone/carbon	3	20.0

CORTEX	MATL	Frequency	Percent
None	Misc. chert	3	20.0
None	Quartzite	3	20.0
None	Limestone/carbon	6	40.0
None	Schist	1	6.7
20	Misc. chert	1	6.7
100	Quartzitic S-S	1	6.7

Holloman Survey: Debitage Attributes by Site

-------------------------- LA no.=67593 Field no.=9 --------------------------

TYPE	MATL	Frequency	Percent
Angular debris	Misc. chert	2	33.3
Angular debris	Limestone/carbon	1	16.7
Flake	Pedernal chert	1	16.7
Flake	Misc. chert	1	16.7
Flake	Limestone/carbon	1	16.7

CORTEX	MATL	Frequency	Percent
None	Pedernal chert	1	16.7
None	Misc. chert	3	50.0
None	Limestone/carbon	2	33.3

Appendix 4

Historic Sites Artifact Inventory

Holloman Test Track Survey: Historic Artifacts from Sites

LA 67585 (OCA:366-1)

Provenience 2

Artifact Description
2 .22 short casing (misfire): maker's mark "H" in circle

Off site

Artifact Description
1 Shotshell base, Winchester "No 12 NUBLACK"

LA 67587 (OCA:366-3)

Provenience 1

Artifact Description
1 30-06 casing from 1943
1 Copper clad spire bullet
1 .30 caliber carbine casing
Several spent bullets

LA 67588 (OCA:366-4)

Provenience 1

Artifact Description
2 .44 caliber Henry rimfire cartridges (fired from same rifle)

LA 67586 (OCA:366-2)

Provenience 1

Artifact Description

1 Washer
1 Wood bolt
1 Electric wire
1 Canvas strip buckle
1 Ketchup bottle with aluminum cap
Various lumber pieces
1 Paint can lid
1 Brown glass jug neck with screw top (possibly Clorox); measurement gradations on side
1 Galvanized steel
Numerous pieces of clear glass lantern globe
1 Mop handle with holes drilled in end with wire through holes
1 Milk can with hole in cap
Numerous wire nails
1 Snap top jelly jar
2 Tar barrels: ht. 23", diam. 14"
1 Large pail: ht. 10", diam. 10"
1 Slip cover pail: "24-6 Standard", ht. 16", diam. 12"
1 Paper drum with metal ends: "Keystone Drum Co Pitt PA", diam. 15"
1 Painter oil can with bail: ht. 12", diam 12"
1 Wood box with metal straps: ht. 10", width 3', length 3'
Remnants of a tapered wood box: 2' X 2' top, 29" X 29" bottom
1 Wooden fence section: ht. 7', len. 3', slats spaced every 5 1/2"
1 Metal rail with 5 square section rods: len. 9'3", wid. 35"
1 One gallon paint can with olive green paint
1 Glass insulator
25 12 ounce beer cans with sanitary, solderless seams, opened with church key
2 Cone topped 12 ounce beer cans
13 Strip-key opened cans: ht. 3 1/2", diam. 3"
3 Caps to cone topped cans
4 Jelly tins (K-Rations), one unopened
1 Juice can: ht. 7", diam. 4"
12 Sanitary solderless cans (vegetable size), opened w/bayonet opener
2 Pieces of flexible conduit
1 Roll of strapping tape
1 Broken hacksaw blade
1 Bed spring (possible army cot)

LA 67590 (OCA:366-6)

Provenience 1

Artifact Description

Pieces of curved thin glass, possibly light bulb
Pieces of clear window glass
Pieces of clear bottle glass, melted
Numerous round wire nails
1 Broken Heinz ketchup bottle: maker's mark "H-25" on top line with a "6" followed by an "I" enclosed within a diamond within a circle on the bottom line.
1 Key strip from metal can
Pieces of burned wood
1 Wooden plank with nails in one end: 2 X 4 which is 2 1/2' long
Several washers
Pieces of beer bottle glass
Pieces of Coca Cola bottle fragments: one piece stamped "Texas"
Eggshells and chicken bones
Numerous crown caps
Miscellaneous bone fragments
1 Clear, weathered bottle/jar base: maker's mark "Puroglass" beneath a horizontal "P" and the numbers "18-2"
1 WW II bomb shell with box fins
1 Base of fluted and sloped bottle (possible flower vase)
1 Base of brown glass bottle: diam. 1.5", maker's mark says "7" followed by an "I" enclosed within a diamond and a circle and the number "2"
1 Metal top to cardboard pepper box shaker
1 Base to ketchup bottle: maker's mark "H-25" on top line with a "6" followed by an "I" enclosed within a diamond within a circle on the bottom line.
Several huge piles of coal klinkers
Pieces of Shenango China of Newcastle, PA. Broken coffee mug (white) with an Indian seated on the base (green)
1 Clear bottle base: maker's mark "H-257" over "H 2" and etching
Numerous miscellaneous rusted metal from cans
1 Mayonnaise-type jar lid
Pieces of steel wire
Portions of cans with sanitary, solderless seams
1 Flattened milk can with opened ends tucked inside
Lots of charcoal
Broken hotel ware plates
1 Large area of melted tar
2 Barrel hoops: diam. 10"
1 Base of clear glass (medicine?) bottle: diam. 1.5" with maker's mark "I" in a diamond within a circle followed by the number "2". The number "6" is at 5 o'clock to the enclosed I.
1 Base of a fluted, clear glass Ball condiment bottle: diam. 1.5"
1 White Shenango China, Newcastle, PA. Hotel ware bowl with identifying lettering in black print
1 55 gal. drum which has bullet holes and tar residue in base
1 Neck of a clear glass milk bottle
1 Roofing tin: 2' portion
1 Burned base of a hotel ware plate

LA 67590 (OCA:366-6) (continued)

Provenience 2

Artifact Description

2 Coal slag heaps on the side of a dune
1 Single edged razor blade
1 .50 caliber spire point bullet which was burned and fired
Numerous pieces of melted clear glass
Numerous pieces of melted blue glass
1 30-06 caliber shell, unfired but crushed w/bullet missing: "WCC 41"
Many bits of metal, burned
1 Rolled toothpaste tube
1 Double male pipe fitting
Portion of clear glass liquor bottle
1 Portion of a small, oval, blue glass medicine bottle
1 Small clear glass men's cologne bottle: "12-I-2" above "Fitch's"
1 Clear glass honey jar with flat pane for label
Several crown caps
1 Portion of cast iron grate
1 Base portion of clear glass Listerine bottle
16 Stream gravel rocks
1 Lip portion of a milk bottle
1 Weathered clear glass jar base: "18 I O" with the I inside both a diamond and a circle
1 Wood joining ripple
1 Piece of large lard-type can
Pieces of brown bottle glass
1 Piece of black rubber pocket comb

Off Site

2 Fired 30-06 caliber cartridges: "WCC 45"